DEVELOPMENT CONCEPT PLAN / ENVIRONMENTAL ASSESSMENT

LAKE/BRIDGE BAY
YELLOWSTONE NATIONAL PARK

U.S. DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

DEVELOPMENT CONCEPT PLAN / ENVIRONMENTAL ASSESSMENT

LAKE / BRIDGE BAY
YELLOWSTONE NATIONAL PARK • WYOMING / MONTANA / IDAHO

January 1992

This document presents alternatives for the Lake and Bridge Bay developed areas on the northwest shore of Yellowstone Lake. In accordance with the 1988 *Final Environmental Impact Statement / Development Concept Plan* for Fishing Bridge, the proposed action would relocate the service station/auto repair facility and housing from Fishing Bridge to Lake in order to protect critical habitat for the threatened grizzly bear. In addition, vehicle circulation routes would be redesigned to alleviate visitor confusion, interpretive opportunities would be provided, and visitor use areas would be clearly defined and separated from administrative, maintenance, and staff residential areas. At Bridge Bay the campground would be rehabilitated, circulation routes improved, and marina facilities upgraded. The implementation of the proposed action at Lake and Bridge Bay is not likely to adversely affect the recovery of the endangered bald eagle population within the greater Yellowstone ecosystem; there would be no effect on the endangered whooping crane or peregrine falcon populations. In combination with existing and proposed management actions, the proposed action is not likely to adversely affect the existence of the grizzly bear population. Impacts on air and water quality would be minor. The overall visitor experience would be improved as a result of redesigned circulation routes, an enhanced interpretive program, and upgraded facilities. Park concessioners would incur expenses as a result of building new facilities for visitors and employees. Upgraded housing and recreation facilities for National Park Service employees would improve morale. A no-action alternative is also considered, as well as an alternative to retain the service station/auto repair facility at Fishing Bridge.

Address comments on this document to

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SUMMARY

This *Development Concept Plan / Environmental Assessment* presents three alternatives for the Lake developed area and two alternatives for the Bridge Bay developed area. Both areas are on the northwest shore of Yellowstone Lake and are 2 and 4 miles southwest of Fishing Bridge, respectively.

LAKE

The Lake developed area includes overnight accommodations and other services for visitors, administrative facilities for the National Park Service (NPS) and the U.S. Fish and Wildlife Service (USFWS), a concession employees' housing area, and an NPS housing and maintenance area. Facilities and services have been developed and modified over time. As a result they do not function as an integrated NPS visitor use area. Circulation patterns are confusing for visitors, administrative and visitor areas are mixed together, and no formal interpretation is provided. Also, in accordance with the 1988 *Final Environmental Impact Statement / Development Concept Plan* for Fishing Bridge, the service station/auto repair facility and NPS and concessioner housing are to be relocated from Fishing Bridge to Lake in order to protect critical wildlife habitat for the threatened grizzly bear.

Alternatives Considered

The proposed action (also referred to as the proposed development concept plan) would correct existing problems at the Lake developed area by redesigning vehicle circulation routes to alleviate visitor confusion, bring visitors closer to the shoreline of Yellowstone Lake, and offer pedestrians opportunities to walk along the lakeshore. Actions to improve access to the hotel would be undertaken as proposed in a 1987 plan. An interpretive exhibit would be created in the fish hatchery area to describe the role of fisheries management at Yellowstone. Visitor use areas would be clearly defined and separated from administrative, maintenance, and staff residential areas. Housing needs for NPS and concession employees would be met. A new post office would be constructed near the entrance to Lake. A service station/auto repair facility would be constructed to replace the Fishing Bridge facility as well as the Lake service station, which was taken out of service at the end of 1989.

Alternative A (no action) would continue the existing conditions and all ongoing programs outlined in management directives. This includes certain actions proposed and approved in the 1988 *Final Environmental Impact Statement / Development Concept Plan* for Fishing Bridge, specifically, the relocation of the service station/auto repair facility and all remaining employee housing to the Lake developed area.

Alternative B would improve access to the lakefront, where a new visitor contact facility would be provided in what is now the general store. The adjacent area would be developed as an outdoor pedestrian plaza. Visitor use areas would be clearly defined and separated from administrative, maintenance, and staff residential areas. Housing needs for NPS and concession employees would be met. The service station would be retained at Fishing Bridge and would be upgraded, and a new auto repair facility would be constructed at Fishing Bridge

instead of Lake; this action would be a change from the approved 1988 Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan.*

Environmental Impacts

The proposed action would result in a disturbance of approximately 24.5 acres of lodgepole pine and grasses. Of this total, approximately 10.5 acres are within the current development zone and have been previously disturbed, and approximately 14.0 acres are on the periphery of the development and would extend the area of disturbance. Removing road segments and scattered buildings, consolidating the Lake Lodge cabins, and using native plant materials to return sites to more natural conditions would restore approximately 9 acres to natural conditions. The proposed action is not likely to adversely affect the recovery of the endangered bald eagle population, and there would be no effect on the whooping crane and peregrine falcon populations. In combination with existing and proposed management actions, the proposed development concept plan is not likely to adversely affect the existence of the grizzly bear population.

Alternative A would result in the disturbance of approximately 1.5 acres of previously disturbed ground due to the construction of the facilities relocated from the Fishing Bridge area. No other actions would be taken. Confusing circulation routes, a lack of interpretive programs, and inadequate facilities would continue to detract from the visitor experience. Housing and recreation facilities for NPS and concession employees would remain substandard.

Alternative B would result in the disturbance of approximately 30.0 acres of lodgepole pine and grasses. Of this total, approximately 16.0 acres are within the current development zone and have been previously disturbed, while approximately 14.0 acres are on the periphery of the development and would extend the area of disturbance. Removing existing road segments and scattered buildings, consolidating the Lake Lodge cabins, and using native plant materials to return sites to more natural conditions would restore approximately 10 acres to natural conditions. Impacts on air and water quality would be minor. Significant historic structures would be adaptively used and maintained; one boathouse that is potentially significant would be removed after being properly documented. Simplifying visitor circulation routes and improving interpretive programs would result in a more enjoyable visitor experience. Vehicles would be restricted along the lakefront, but pedestrians would be able to enjoy the area without interference from cars. Improved housing and recreation facilities for NPS employees would improve morale. Upgrading the Fishing Bridge service station and constructing a new auto repair facility, in association with other existing development, would continue long-term development in an area identified as important grizzly bear habitat.

BRIDGE BAY

The Bridge Bay area consists of a marina and related facilities, plus a 420-site campground with an amphitheater for interpretive programs. The marina and campground were built in the 1950s and 1960s and have become some of the most popular facilities in the park. Heavy use has resulted in congestion and crowded conditions at both areas. The nearby Natural Bridge area offers interpretive exhibits and a small parking area.

Alternatives Considered

The proposed action would recommend rehabilitating the campground, improving circulation roads, upgrading marina facilities, and dredging the entrance to the bay; at Natural Bridge the visitor experience would be improved. The second alternative would continue existing conditions (no action).

Environmental Impacts

The proposed action would result in a disturbance of approximately 1 acre of lodgepole pine and grasses. Impacts on water quality and other resources resulting from dredging operations would be evaluated under the National Environmental Policy Act, and any required compliance actions would be met prior to dredging operations. The proposed action is not likely to adversely affect the recovery of the endangered bald eagle population, and there would be no effect on the whooping crane and peregrine falcon populations. In combination with existing and proposed management actions, the proposed development concept plan is not likely to adversely affect the existence of the grizzly bear population.

At Natural Bridge trail erosion problems would be reduced, and the visitor experience would be made more pleasant by restoring disturbed areas to natural conditions.

Congestion and crowded conditions would continue at the campground and marina under the no-action alternative, and the visitor experience at Natural Bridge would be limited. In order to provide the current level of service, dredging of the entrance to the bay could be required in the future. Impacts on water quality and other resources resulting from dredging operations would be evaluated under the National Environmental Policy Act, and any required compliance actions would be met prior to dredging operations. Existing conditions do affect the grizzly bear, even though ongoing management actions strive to ensure that the existence of the grizzly bear population is not adversely affected.

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PURPOSE OF AND NEED FOR THE PLAN

Lake Hotel

INTRODUCTION

Yellowstone National Park is a major destination for tourists from throughout the United States and the world. More than 2 million people visit the park annually, and approximately half go to Lake and Bridge Bay where there are overnight accommodations and facilities for boating on Yellowstone Lake. Lake and Bridge Bay are on the northwest shore of Yellowstone Lake; Lake is approximately 2 miles southwest of Fishing Bridge, and Bridge Bay is approximately 2 miles southwest of Lake. The developments are about 21 miles northwest of Grant Village/West Thumb, 16 miles south of Canyon Village, and 27 miles from the east entrance (see Park/Region map). Vegetation in this area is predominantly lodgepole pine.

Major highways within the park that provide access to the northern Yellowstone Lake area are US 20/191/287 from the west entrance, US 89 from the north entrance, US 212 from the northeast entrance, US 14/16/20 from the east entrance, and US 89/191/287 from the south entrance. All main highways within the park intersect the Grand Loop Road, which provides access to the Lake and Bridge Bay developed areas.

The Lake developed area includes facilities for visitors, National Park Service (NPS) administration and operations, and park concessioners. Visitor facilities range from overnight accommodations at the Lake Hotel, Lake Lodge, and cabins to a general store and a post office. Facilities for administration and operations include a ranger station, office buildings, two boathouses, maintenance facilities, and employee residences. Other support development includes a small hospital, a U.S. Fish and Wildlife Service (USFWS) administrative complex, concessioner housing, parking areas, access roads, and remnants of the Grand Loop Road along the lakeshore. The USFWS complex was built in the early 1930s and is also used for housing and storage.

Facilities and services in the Lake area have been developed and modified over time. As a result, they do not function as an integrated, efficient NPS visitor use area. Visitors often have a difficult time finding services, there is frequently no clear separation of visitor and administrative functions, and conflicts between pedestrians and vehicles occur along the lakeshore. In addition, little NPS orientation or interpretation is provided about resources or services and facilities.

The development at Bridge Bay was built in the 1950s and 1960s to upgrade aspects of the visitor experience while ensuring the protection of fragile resources. This development includes boat rental and tour boat facilities, other marina operations, a ranger station, a boat repair shop, a concessioner-operated store, a 420-site campground, amphitheater, and campground ranger station. Heavy use of the area has resulted in congestion and crowded conditions in both the marina and campground.

The Natural Bridge area is near Bridge Bay and provides a limited visitor experience, with an interpretive exhibit and nondesignated social trails. There has been considerable erosion along the trails.

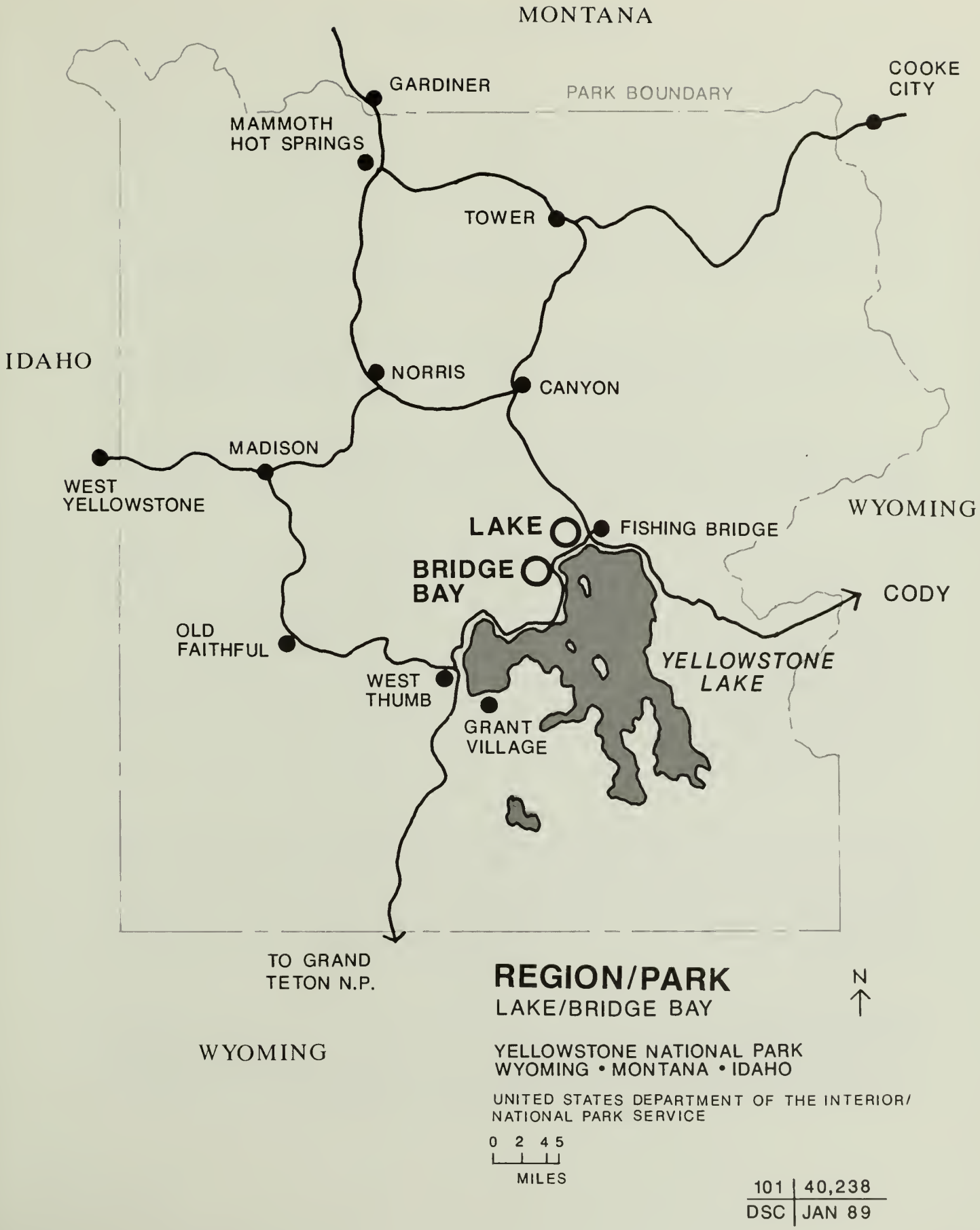
In 1988 the National Park Service prepared a *Final Environmental Impact Statement / Development Concept Plan* for the Fishing Bridge developed area. This proposed development concept plan also has ramifications for the Lake and Bridge Bay areas. The 1974 *Master Plan*

for Yellowstone National Park identified the Fishing Bridge developed area as a critical wildlife habitat and proposed the eventual phasing out of accommodations and support facilities to permit the restoration of more natural ecological conditions. This proposal received added impetus when the grizzly bear was listed as threatened under the Endangered Species Act in 1975. The Fishing Bridge area was identified as a primary source of conflict between humans and grizzlies, and there were unacceptably high numbers of bear deaths in the area. Thus, in 1983 a development concept plan was initiated for the Fishing Bridge area, which led to the preparation of a *Final Environmental Impact Statement / Development Concept Plan* that was completed in 1988.

The alternative selected for the Fishing Bridge area called for the removal of the 310-site NPS-operated campground at that area. These campsites were to be replaced either at a new campground or by adding sites to existing campgrounds when visitor use at the 12 other park campgrounds exceeded 95% of capacity between June 25 and August 20 for three years out of five. The 95% occupancy rate at campgrounds has been met, and the scoping process to replace the Fishing Bridge campsites is scheduled to begin in spring 1992. Other planned actions included removing the Fishing Bridge service station/auto repair facility, photo shop, remaining cabins, employee housing, and storage sheds. The service station/auto repair facility was to be replaced at Lake. All NPS and concessioner housing at Fishing Bridge was also to be relocated to the Lake developed area.

The purpose of this plan is to protect resources, to offer a quality visitor experience, and to provide for efficient administration and operations.

Documents relevant to this planning effort include the 1974 *Master Plan* for Yellowstone National Park, which establishes guidelines for overall use, preservation, management, and development of the park; the 1986 *Interpretive Prospectus,* which outlines interpretive media and themes; the 1987 *Environmental Assessment, Access and Circulation Improvements, Lake Hotel;* and the 1988 *Final Environmental Impact Statement / Development Concept Plan* for Fishing Bridge.



REGION/PARK

LAKE/BRIDGE BAY

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YELLOWSTONE NATIONAL PARK
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UNITED STATES DEPARTMENT OF THE INTERIOR/
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LAKE

Commercial services at Lake date back to the early days of the park. The Lake area provides 22% of all overnight accommodations in the park. Lodging is available at the Lake Hotel (194 rooms) and cabins (102 units) and the Lake Lodge cabins (186 units). Food service is available at the hotel dining room (210 seats) and at a cafeteria (179 seats) in the lodge; there is also a bar (8 to 10 seats) at the lodge. The hotel has a gift shop and beauty shop, and the lodge a gift shop and laundry facilities. These facilities are owned by the National Park Service and operated by TW Recreational Services (TWRS) under a concession contract effective through October 31, 2001.

A general store sells souvenirs, apparel, fishing and camping supplies, film, and groceries; it also has a 25-seat soda fountain. The store is operated by Hamilton Stores, Inc., (HSI) under a concession contract that is effective through September 30, 1999.

The Lake hospital has 10 in-patient beds, emergency facilities, a pharmacy, and an emergency/ambulance entrance. There is a temporary helipad nearby. The hospital is owned by the National Park Service and operated by Yellowstone Park Medical Services (YPMS) under a concession contract that expires October 31, 1992.

The original alignment of the Grand Loop Road took visitors along the Yellowstone Lake shoreline to the front of the Lake Hotel, and facilities and services were designed to take advantage of this access pattern. In 1971 the road was rerouted around the Lake developed area to eliminate hazardous intersections, relieve congestion, and reduce numerous roadside conflicts for visitors. The new circulation system created additional problems, however, because visitors were brought into the Lake area from the back, through a forested area and past several service road intersections. A spur access road was constructed to allow visitors to see the front of the historic Lake Hotel, but the main entrance for registering guests was moved to rear. To reduce the visual intrusion of vehicles on the natural setting of the lake, the road along the northwest shoreline was abandoned (see Lake – Existing Conditions map).

As a result of these changes and a predominance of dead-end roads, visitors to Lake are often confused by the clutter of nonvisitor facilities and are frustrated by a lack of direct access to Yellowstone Lake. Furthermore, there is no major visitor contact facility to provide information, to help visitors find services and facilities, or to explain the area's cultural and natural resources. The overall visitor experience does not take advantage of the spectacular Yellowstone Lake views, is historically inaccurate, and is inconsistent with park management objectives to provide a quality visitor experience.

The visitor circulation problems at the Lake Hotel were addressed in the 1987 *Environmental Assessment, Access and Circulation Improvements* for the Lake Hotel, and construction has been programmed to correct a majority of these problems. Arriving visitors will be routed to the front of the hotel for registration and orientation, and the rear of the hotel will be used as a secondary visitor drop off and for access from the parking area.

Problems that need to be addressed by this plan include the following:

Circulation/roads/parking/trails: Flow-through traffic was eliminated when the road was rerouted and replaced by a system of dead-end roads, creating numerous intersections where visitors must decide which way to go. The resulting traffic pattern makes many facilities hard to find and get to. For example, vehicle access to the lakefront, the general store, and the ranger station is by way of poorly designed and inadequately signed connector roads from the main road.

Vehicular circulation problems in the Lake area are compounded by a limited pedestrian trail system. There are some trails, but the trails connecting Lake to Bridge Bay and to Fishing Bridge are poorly defined social trails. The haphazard network of social trails and the lack of formalized or designated trails causes dispersed visitor use patterns. Visitors and employees have little choice but to rely on their cars to get around.

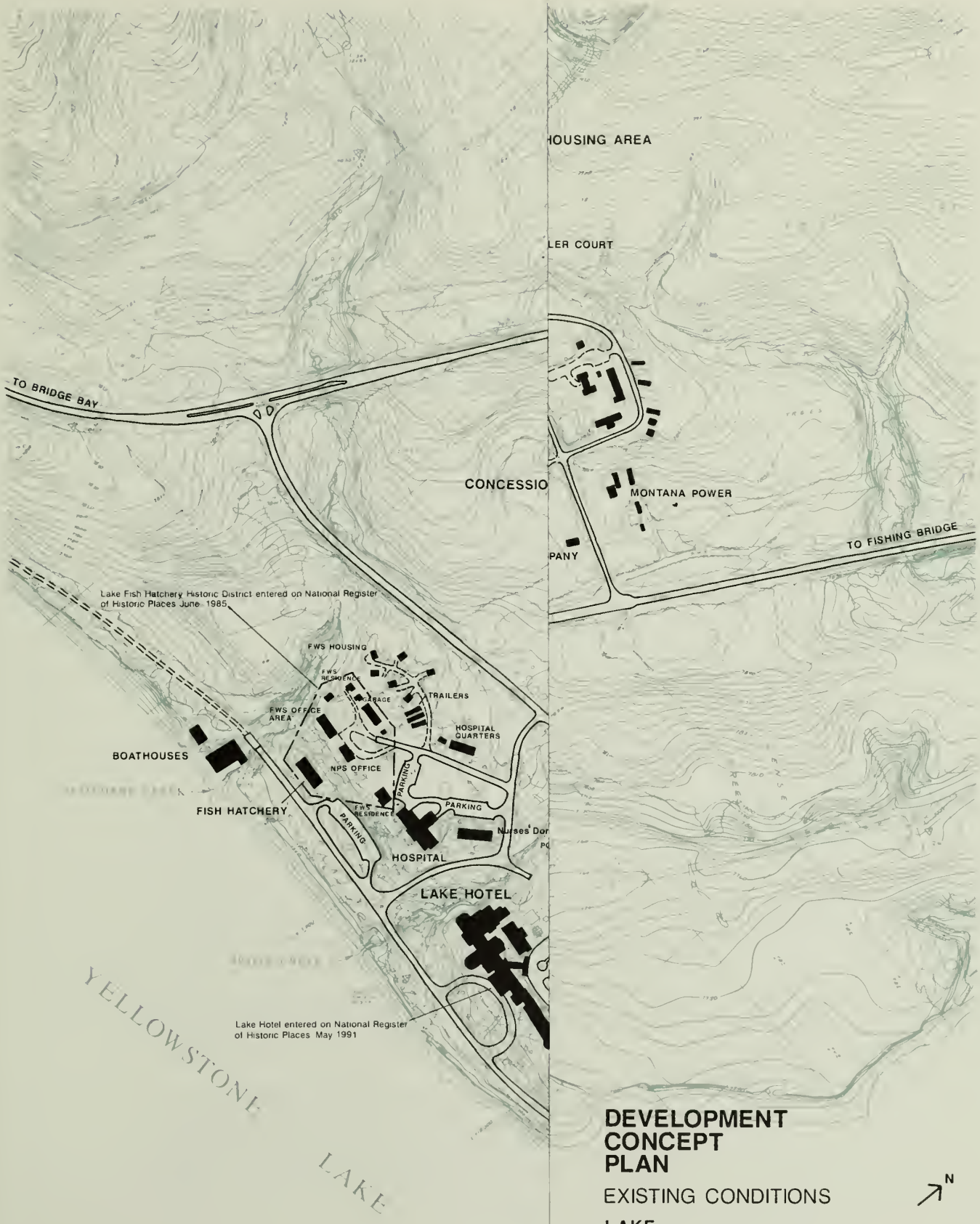
Shoreline erosion: Wave action and possible sheet wash have caused considerable erosion along the shoreline of Yellowstone Lake. There are also a number of culverts and pipes that carry heavy runoff, which further accelerates bank erosion. Visitors have contributed to this problem by using these erosion channels to gain access to the shore.

Interpretation: Very little interpretation about the area's natural and cultural resources is provided for day or overnight visitors. There is an exhibit on bears at the Lake ranger station. Overnight visitors who want to take part in interpretive activities must go to Bridge Bay or Fishing Bridge to attend evening programs. The 1986 *Interpretive Prospectus* recommends constructing a visitor center north of the Lake area, off the Grand Loop Road. This location was considered but not further evaluated. Although it would provide scenic views of the lake and mountains, visitor use in this area would encroach on grizzly bear habitat. Also, this location would not be readily accessible for overnight visitors at Lake.

Lodging: Both the hotel and the lodge have been recently renovated. However, the visitor cabins at the hotel and lodge need repairs. There is little space between cabins, space for guest vehicles as well as fire vehicle circulation is inadequate, and the area is not landscaped, resulting in a poor visitor experience. The Lake Lodge cabins are very close to Lodge Creek, an area used by grizzly bears during the spawning season.

Food service: Food service in the area is available only in the summer, and it can be time consuming to obtain, particularly for visitors seeking a fast-food service. Most day visitors wanting lunch must dine at either the Lake Hotel restaurant or the Lake Lodge cafeteria, both of which generally have long waiting lines. Limited food service is available at the general store.

Hospital Area: At the hospital area the emergency helipad is a temporary facility, and the location of the incinerator poses safety problems for helicopter landings during inclement weather. The helipad is also used as a volleyball court.



DEVELOPMENT CONCEPT PLAN

EXISTING CONDITIONS

LAKE

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YELLOWSTONE NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

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MAINTENANCE/HOUSING AREA

TO ELEPHANT BACK

TRAILER COURT

SPRINGS

STABLE

NPS HOUSING

TO BRIDGE BAY

NPS MAINTENANCE AREA
FIRE STATION

Utah Dorm

MONTANA POWER

CONCESSIONER EMPLOYEE HOUSING AND RECREATION

Teal Dorm

GRAND LOOP ROAD

TELEPHONE COMPANY

TO FISHING BRIDGE

Lake Fish Hatchery Historic District entered on National Register of Historic Places June, 1985

FWS HOUSING

LODGE CABIN AREA

TRAILERS

FWS OFFICE AREA

HOSPITAL QUARTERS

BOATHOUSES

NPS OFFICE

PARKING

FISH HATCHERY

EMPLOYEE HOUSING

LAUNDRY

PUB

Nurses' Dormitory

POST OFFICE

EMPLOYEE DORM

HOSPITAL

LAKE LODGE

LAKE HOTEL

HOTEL CABIN AREA

Lake Hotel entered on National Register of Historic Places May 1991

YELLOWSTONE LAKE

EMPLOYEE DORM

GAS STATION

GENERAL STORE

RANGER STATION

EXISTING
BUILDING
PAVED ROAD
UNPAVED ROAD

DEVELOPMENT CONCEPT PLAN

EXISTING CONDITIONS

LAKE

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Service station/auto repair facility: Because Lake is a relatively remote area, a service station/auto repair facility is needed to provide basic visitor support services (the nearest auto repair facilities outside the park are more than 80 miles from Lake). The Lake service station was taken out of service at the end of the 1989 season because of its poor location, lack of repair facilities, and the age of the fuel tanks. The only other service station/auto repair facility in the area is at Fishing Bridge; the 1988 Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan* calls for that facility to be relocated to the Lake area.

Resource management: Grizzly bears are and will continue to be attracted to riparian areas and spawning streams in the Lake/Bridge Bay areas, posing the potential for bear/human conflicts.

Rehabilitation/restoration: There is no comprehensive restoration/rehabilitation plan for previously disturbed visitor use and administrative facilities within the Lake/Bridge Bay area.

Fish hatchery complex: The Fish Hatchery Historic District was listed on the National Register of Historic Places in 1985. The fish hatchery building is no longer operational, and the two nearby boathouses are dilapidated and used primarily for winter season storage of boats and other equipment. Other structures are used for fisheries management programs, administrative activities, storage, and housing. The number of researchers has increased over the past several years, but office space and housing for staff and visiting researchers are inadequate.

Fire prevention: There is no fire station within the visitor use area at Lake, and fire trucks are housed at the housing/maintenance complex; this area is crowded, and the existing facility is inadequate. The 1988 Yellowstone fire did not affect the immediate area; however, in the event of a fire at Lake, access for firefighting equipment would be indirect and troublesome because of the road circulation situation.

NPS and concessioner employee housing and recreation: Park housing for concessioner and NPS employees is insufficient for both seasonal and essential year-round staff. The housing areas are cramped, and many structures are substandard. In addition, the Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan* calls for moving all NPS and concessioner housing from Fishing Bridge to Lake. There is no existing housing that can be used for relocated employees. As funding has become available, units have been relocated. At this time some concession and NPS employees must still be relocated. The area now used for trailers and recreation vehicles (RVs) has no room for expansion, although increasing numbers of concessioner employees are requesting RV spaces.

There is no community center or recreation area in this remote duty station for NPS employees to gather at. The concession employee recreation facility next to the Lake Lodge building is too small, and noise from this facility frequently annoys lodge guests and has resulted in complaints. Employee housing next to the lodge also causes visitor/employee conflicts and is visually intrusive.

Maintenance: The NPS maintenance area is in the northern part of the developed area, near the NPS housing area. The area consists of temporary carpentry, plumbing, and electrical shops. Storage space is lacking, and the equipment/vehicle repair shop and fire station are too small. There is no maintenance facility for the concessioner at Lake.

BRIDGE BAY

The Bridge Bay marina includes 119 rental slips, a boat repair and parts facility, boat trailer parking, and a fuel facility, all operated by TW Recreational Services. Guided boat trips and boat rentals are also offered. A marina and camping supply store is operated by Hamilton Stores. Facilities are owned by the National Park Service.

The Bridge Bay campground, which opens in late May and closes at the end of September, provides 420 campsites and an amphitheater for interpretive programs. During the summers 1989 through 1991 the campground was the site of an experimental campground reservation system. Such a reservation system was suggested during planning process for Fishing Bridge as a means of better utilizing existing campsites in Yellowstone National Park. Before the reservation system was implemented, Bridge Bay typically was the third campground in the park to fill (after the Norris and Madison campgrounds). Each year the public has become more aware of the campsite reservation system. In summer 1991 Bridge Bay was typically the first campground to fill, and more than 50% of the campers had made a reservation.

There are difficulties at the Bridge Bay marina facilities and the campground in serving the large number of visitors to the area, resulting in long lines and crowded conditions in both locations.

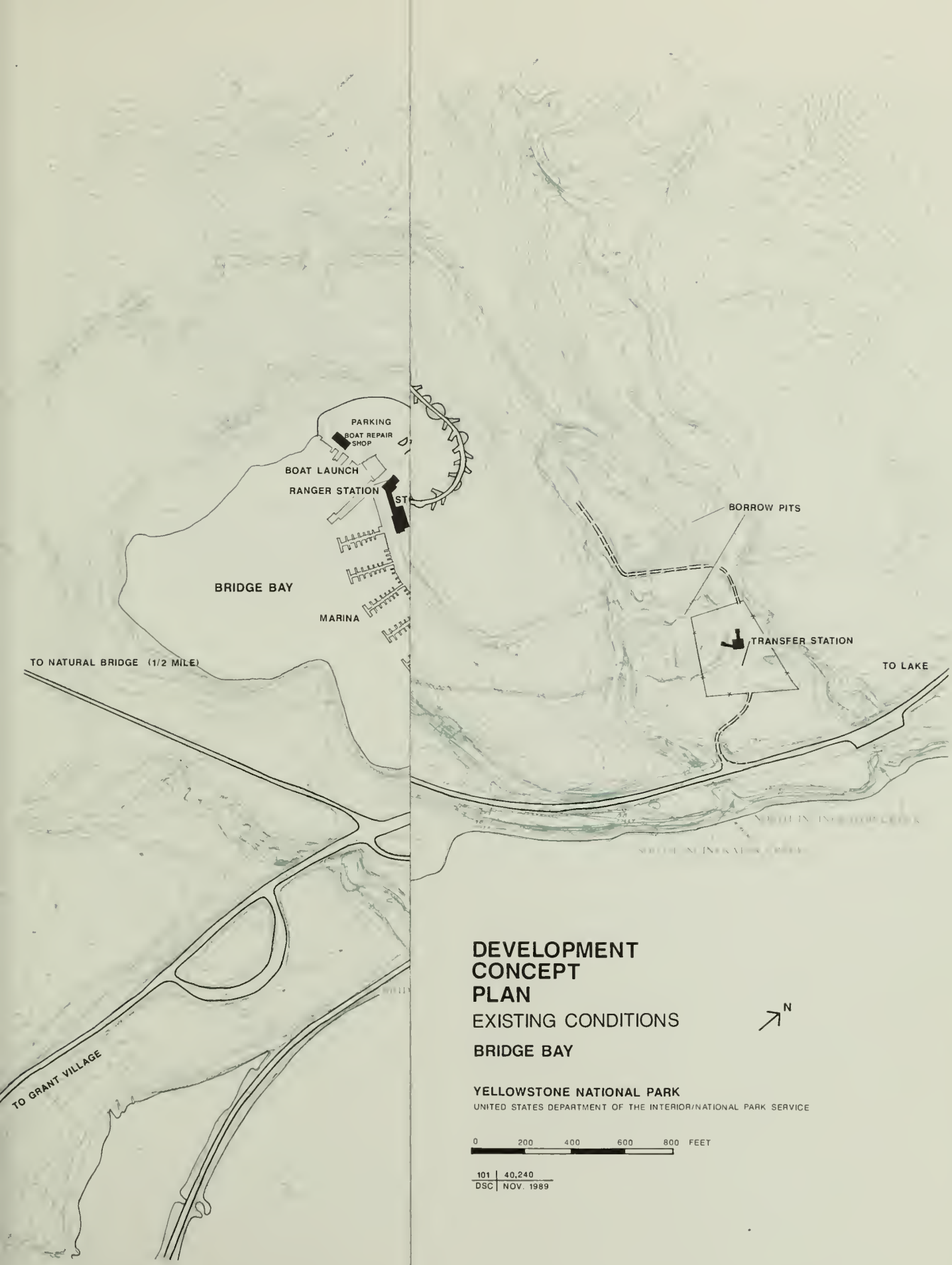
Marina: The marina bulkhead is settling somewhat and shifting. The entrance to Bridge Bay is silting in, causing problems for boats entering and leaving the bay, particularly during dry periods when conditions may preclude all use.

The marina store is too small to accommodate both campground and marina users. Service vehicles park at the rear of the building, but they can be seen by visitors who must approach the store from the rear parking lot. Access for service vehicles is a narrow, dead-end road, so vehicles must back out when leaving, creating potential safety problems for pedestrians because of poor sight distances.

Campground: There is only one entrance lane to the campground. This causes confusion and congestion at the campground entrance road intersection when vehicles line up to register. Vehicles that are already registered often get caught in long lines when re-entering the campground.

The campground registration building is a small structure that does not have enough space to service the large number of campers coming to the area or to house the computer equipment associated with automated, advance registration.

There are no shower or laundry facilities to serve campground and marina users.



DEVELOPMENT CONCEPT PLAN

EXISTING CONDITIONS

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BRIDGE BAY

YELLOWSTONE NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

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CAMPGROUND
420 SITES

LOOP A

LOOP B

COMFORT STATION

PARKING

CAMPGROUND

COMFORT STATION

AMPHITHEATER

PARKING

BOAT LAUNCH

RANGER STATION

STORE

PARKING

BRIDGE BAY

MARINA

ICE HOUSE

CAMPGROUND REGISTRATION
RANGER STATION RESIDENCE

COMFORT STATION

PARKING

SEWAGE DUMP STATION

PICNIC AREA

TO NATURAL BRIDGE (1/2 MILE)

BORROW PITS

TRANSFER STATION

TO LAKE

GRAND LOOP ROAD

YELLOWSTONE LAKE

TO GRANT VILLAGE

EXISTING DEVELOPMENT
BUILDING
PAVED ROAD
UNPAVED ROAD

DEVELOPMENT CONCEPT PLAN

EXISTING CONDITIONS

N

BRIDGE BAY

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Sites at the campground are not level, and tent pads are too small; circulation routes are poor; and vegetation has been trampled or removed, providing little site separation. There are recurring problems with bison using areas of the campground, which poses safety problems for visitors.

The small ranger station/residence must be used for both living quarters and visitor functions (information and orientation, backcountry permit distribution). Because it is in a visible and easily accessible location, NPS employees are seldom able to go off duty.

The back loops of Bridge Bay campground are within sight and sound of the Bridge Bay transfer station, a maintenance facility and storage area. Noise from administrative activities in the area disturbs campers, and the site is visually unappealing for campers staying in the nearest sites.

Resource management: Grizzly bears are and will continue to be attracted to the Bridge Bay area, particularly during the cutthroat trout spawning season. This will continue to pose a potential for conflicts between bears and humans.

Natural Bridge: The visitor experience at Natural Bridge is marred by erosion, lack of trails, and outdated and deteriorated exhibits. There is no trail access from the Grand Loop Road to Natural Bridge. The dredge spoil piles from Bridge Bay are stored near the road, further intruding on the natural scene.

MANAGEMENT OBJECTIVES

The following objectives were developed as the basis for preparing and analyzing alternatives for the Lake and Bridge Bay developed areas:

- Allow visitors to experience the natural and cultural resources in the area while ensuring the protection and preservation of those resources.
- Physically separate visitor services from administrative use areas, and eliminate the clutter of nonvisitor facilities.
- Consolidate all housing and office facilities, and accommodate future needs by allowing some growth within the physical and resource limits of the administrative site.
- Improve visitor orientation to and interpretation of the area.
- Provide opportunities for a variety of visitor activities, including interpretive and recreational functions.
- Provide opportunities to encourage pedestrian and bicycle circulation.
- Maintain and enhance views of the prime natural resource — Yellowstone Lake.
- Improve visitor vehicle circulation and safety.
- Reduce crowded employee housing conditions, and improve the quality of community services for all employees.
- To prevent any further displacement of grizzly bears, locate as much of the proposed additional development as possible within zones of influence attributable to existing developed areas.
- Alleviate long-term conflicts between bears and humans.
- Rehabilitate previously disturbed areas to their natural condition and habitat quality.
- Maintain water quality in Bridge Bay marina and mitigate any deterioration.

Lake Lodge

ALTERNATIVES FOR ADDRESSING THE ISSUES

Three alternatives are being considered for the Lake developed area. The proposed action and alternative B would recommend changes in circulation patterns and additional facilities; alternative A would continue existing conditions. Cost estimates for implementing the alternatives are included in the appendix. Significant impacts are summarized in table 1 at the end of this section.

PROPOSED ACTION / DEVELOPMENT CONCEPT PLAN

The goal of the proposed action is to redesign the Lake developed area so that it will better function as an integrated visitor use area. Visitor confusion resulting from the present road system would be alleviated, visitors would have opportunities to walk on paths along the lakeshore, and interpretive services would be provided to enhance the visitor experience. Visitor use areas would be clearly defined and separated from administrative, maintenance, and staff residential areas. Actions in the Lake developed area that were proposed and approved in the 1988 Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan* would be accomplished. NPS and concession employee housing needs would be met. An overriding objective of the proposed action is to provide visitor facilities and services in such a way as to minimize encounters between bears and humans.

Access and Circulation

Current access to the Lake developed area from the Grand Loop Road would be retained. To improve access throughout the developed area, the main entrance road would first lead visitors past a service station and vehicle repair facility. A clearly marked loop road would then lead directly to the front of the Lake Hotel and along the lakeshore, providing access to the fish hatchery complex to the west of the hotel and to the general store and ranger station to the east (see the Proposed Action map). Access to Lake Lodge would be at a clearly marked T-intersection north of the ranger station. The lodge road would end in a vehicle turnaround.

The lakeshore road in front of the general store would be redesigned, and a separate pedestrian trail would be provided along the roadway. The lakeshore road would be relocated away from the shoreline at the ranger station. These changes would allow visitors to drive or stroll safely along the lakeshore. A monitoring program would be established to evaluate and correct any shoreline erosion.

Current access to the hospital and the USFWS administrative area would be retained, but the intersection on the entrance road would be improved and clearly marked. Circulation in the hotel cabin area would be redesigned as a loop to eliminate existing dead-end roads and to facilitate emergency access.

A portion of the original lakeshore road alignment would be used as a seasonal hiking/biking trail to link the Lake and Bridge Bay areas. The trail would pass through the Bridge Bay campground on its way to Natural Bridge. The old road alignment and social trail from the ranger station to Fishing Bridge would be rehabilitated for use as a hiking trail.

Information/Orientation/Interpretation

As presented in the 1986 *Interpretive Prospectus*, interpretation would focus on Yellowstone National Park as the core of the largest intact ecosystem in the temperate zone of the earth. Its unique volcanic origin created a vast stage where the interaction and interdependence of the park's landforms, climate, soils, thermal waters, natural fires, and organisms can be contemplated — from heat-loving bacteria and algae to fish, elk, grizzly bears, and people.

Informal interpretive programs would continue to be provided at the historic ranger station. Boating and backcountry permits would also be issued there.

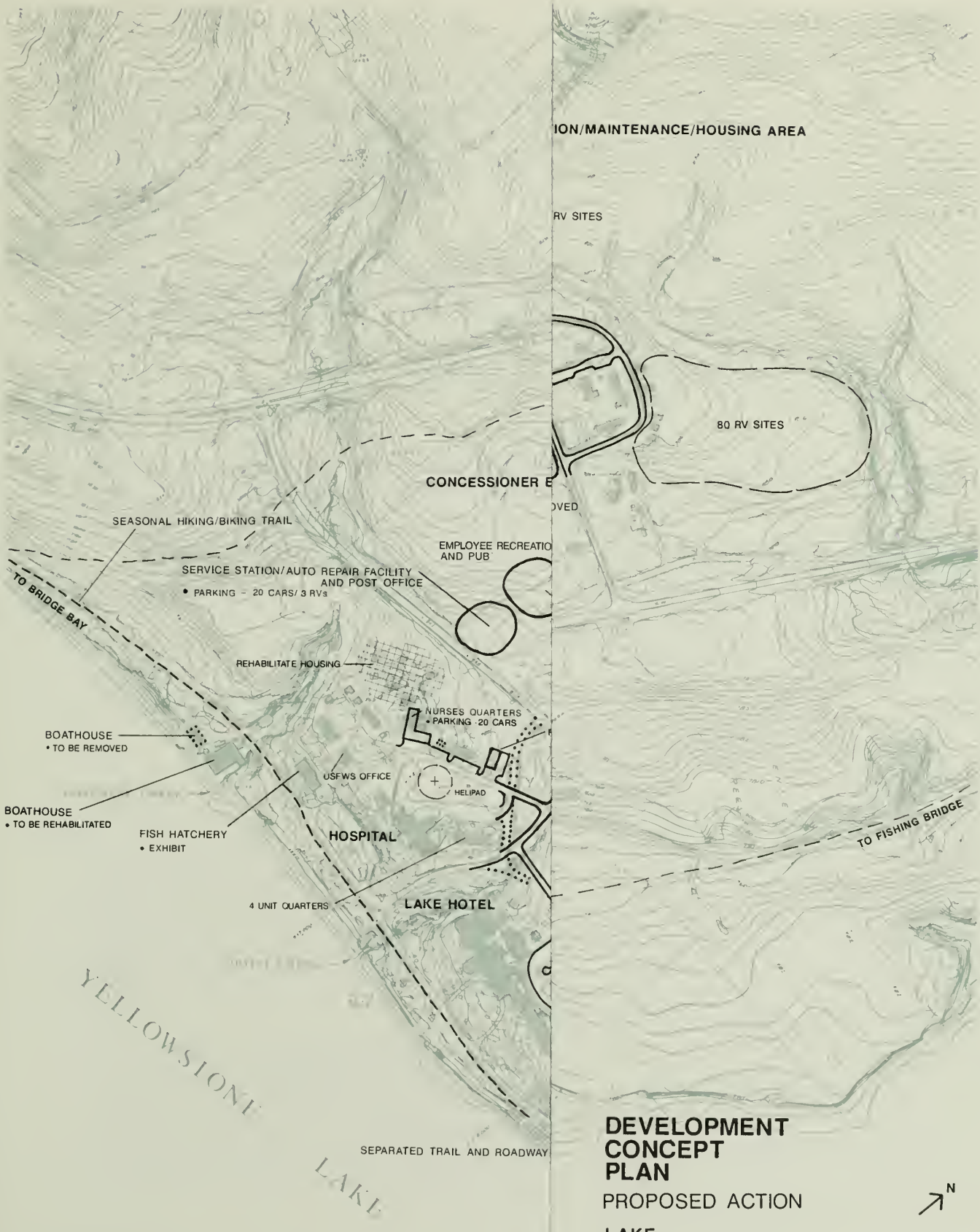
In the Fish Hatchery Historic District a "living history" exhibit would be created to interpret the park's historic role in fisheries management. Exhibits would include the display of live native fish, a discussion of the interrelationships of fish and other park wildlife, the tools of the fisheries profession, and the evolution of the fisheries management philosophy. The U.S. Fish and Wildlife Service would provide, install, and maintain aquariums, which would be stocked with wild trout that would be captured and then released at the season's end. That agency would also supply historical documents, artifacts such as equipment and clothing, and photographs to tell the story of fisheries management in Yellowstone. The U.S. Fish and Wildlife Service has arranged for the donation of one of their early boats (which is being restored by the original boatmaker's son) and would transport it to Yellowstone for display in association with these exhibits. Boathouse and hatchery restoration would primarily be a cooperative endeavor between the U.S. Fish and Wildlife Service and the National Park Service. The operating season for this interpretive area would depend on the park's bear management program. The interior of the west end of the fish hatchery would be designed for evening programs.

Service Station/Auto Repair Facility and Post Office

The service station/auto repair facility and post office would be relocated to an already disturbed site near the entrance to the Lake developed area. The design of these buildings would be architecturally compatible with the historic structures in the Lake area. Parking would be provided for 20 cars and 3 RVs. Two new dormitories, one for service station employees and the other for Hamilton Store employees, would be constructed behind the service station.

Fish Hatchery Historic District

Besides its new interpretive function, the other structures in the Fish Hatchery Historic District would be retained for use by the U.S. Fish and Wildlife Service. These uses include offices, laboratory, housing, and storage. All buildings contributing to the historic district would be stabilized and rehabilitated to their historic appearance. The building now used by the National Park Service as its south district office would be returned to the U.S. Fish and Wildlife Service for its use. Trailers and other nonhistoric housing units would be removed, and replacement units would be provided in the NPS housing area. The existing parking area (10 cars) would be maintained for USFWS staff parking. The historic boathouse would be retained and rehabilitated while the other boathouse (which dates from the 1940s) would be removed.



DEVELOPMENT CONCEPT PLAN

PROPOSED ACTION

N

LAKE

YELLOWSTONE NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

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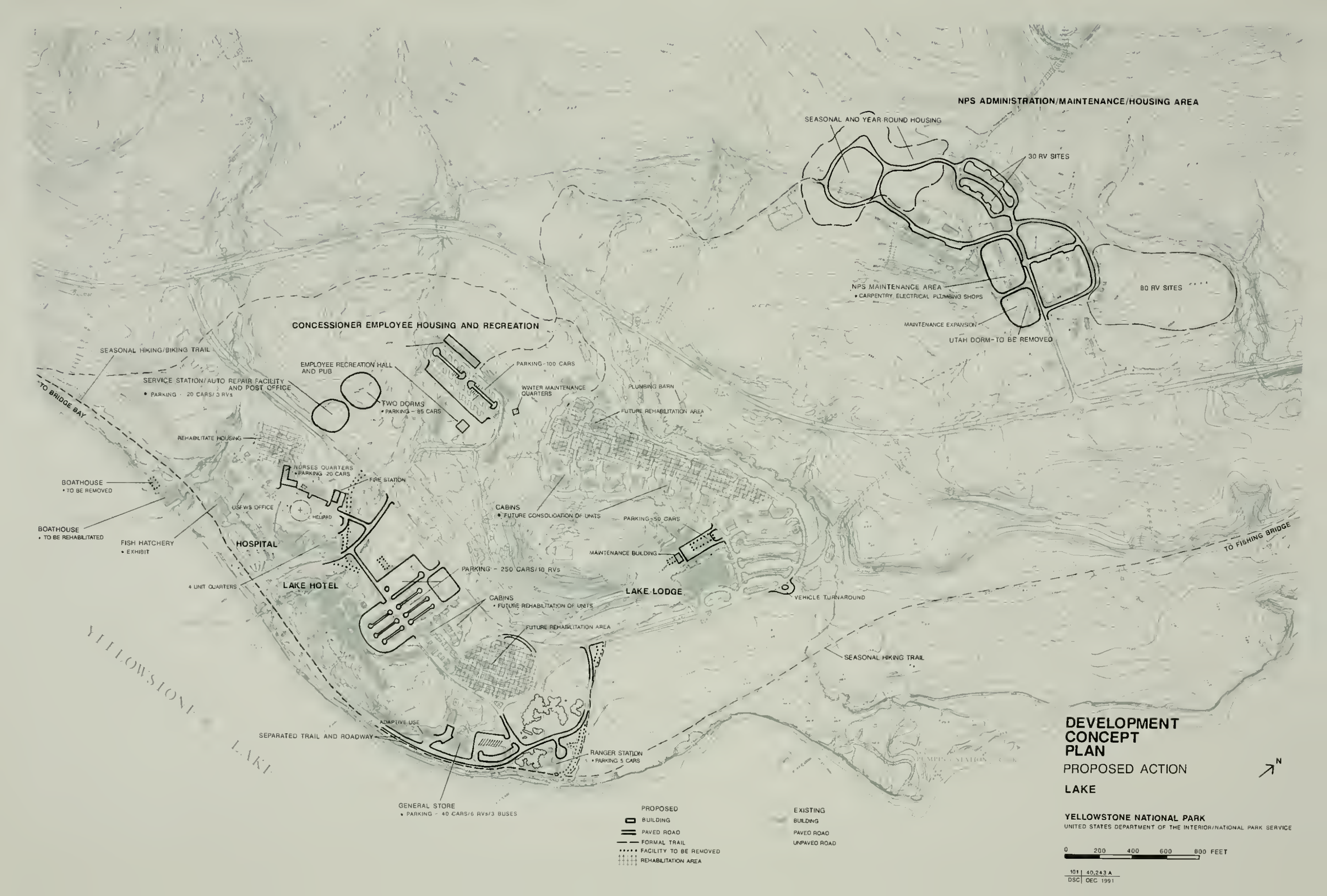

DEVELOPMENT CONCEPT PLAN

PROPOSED ACTION

LAKE

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YELLOWSTONE NATIONAL PARK

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Lake Hospital Area

The hospital and parking areas would be retained. A permanent emergency helipad would be developed near the hospital. The existing nurses' dormitory would be converted to four housing units, and a new dormitory for nurses (20 rooms), which would be designed to be compatible with the Fish Hatchery Historic District, and parking (20 cars) would be constructed south of the new nurses dormitory. The incinerator would be relocated from the temporary helipad area to a site next to the hospital.

A fire station for the Lake developed area would be constructed near the hospital. This would consolidate emergency services and provide easy access to all area facilities. The station would include a training room, two vehicle bays, rescue cache, storage space, and quarters for four employees.

Lakefront Developments

The general store would be retained at its present location. Public restroom facilities would be added, and bear-proof garbage storage facilities would be constructed. Parking would be provided for 40 cars, six RVs, and three buses.

The former Lake service station, which was closed in 1989, would be rehabilitated and adaptively used.

The ranger station would be retained for general information and the issuance of backcountry and boat permits. Parking for five visitor's cars besides staff parking would be provided. Additionally, the existing offices would be supplemented by converting the ranger station apartment into an office for subdistrict ranger personnel.

Lodging and Food Services

The present functions of both the Lake Hotel and Lodge, which have recently been restored to their historic appearance, would be continued. Visitors would be routed to the front of the hotel for registration. Long-term parking (250 cars/10 RVs) would continue to be at the rear of the hotel in a redesigned parking area. The hotel cabins would be retained until funds became available to consolidate them into motel-style buildings in a compatible architectural style. The room next to the boiler room behind the hotel would be rehabilitated and adaptively used.

To help alleviate conflicts between bears and humans, the Lake Lodge cabins would be consolidated into motel-type buildings in a compatible architectural style and located away from Lodge Creek. These larger, less numerous units would greatly reduce the total size of the cabin area. The larger of the two employee dormitories behind the lodge would be retained. The smaller dormitory and the employee pub would be removed. In their place a small maintenance building and an employee parking area (50 cars) would be constructed.

NPS Administration/Maintenance/Housing Area

The NPS administrative area would be redesigned to meet current and projected year-round requirements. Maintenance and storage facilities would be expanded once a concessioner's dormitory had been removed and new facilities constructed. Carpentry, electrical, and plumbing shop functions for the park's southern half are handled from Lake each summer. These shops are currently housed in temporary structures. Relocating the shops into larger, well-constructed facilities would enable the staffs to be more efficient and better able to respond to maintenance needs.

The NPS south district maintenance offices, currently housed in a USFWS building, would be relocated to this area. Parking would be provided for maintenance equipment. Boat storage would be provided in the maintenance area. The current fire station in the administrative area would be enlarged or replaced to better serve the Lake area as well as to provide backup for the new Lake fire station.

Replacing temporary and substandard housing and constructing additional employee housing are important components of this plan. These actions are necessary to complete the removal of employee quarters from Fishing Bridge, in accordance with the recommendations of the Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan*. Housing for year-round NPS employees would be west of the existing housing. Seasonal quarters for the National Park Service and other agencies would be primarily in areas where RV pads and mobile homes now exist.

Because of the variability of the park's budget and changing demographics, a variety of housing types and sizes would be provided to meet the varying needs and numbers of year-round and seasonal employees. An additional 25 two- or three-bedroom units would be needed to accommodate year-round employees, and six existing units would be rehabilitated. An additional 58 efficiency, one- and two-bedroom units would be needed for seasonal employees, and 33 existing units would be rehabilitated. Housing unit numbers are based on past and current staffing levels, as well as future projections. All units would be designed for energy efficiency and would meet life safety standards. The new units would be more spacious inside, have larger bedrooms, better furnishings, and more storage and work spaces. All units would be designed to take advantage of views, privacy, aesthetics, and solar gain. Housing areas would also meet the environmental requirements of living among threatened or endangered animal populations. A total of seven sites for RVs would be provided; eventually the National Park Service intends to remove all mobile homes.

Related development would include an NPS community center, playground facilities, a picnic area, and a trail network. A designated foot trail would improve pedestrian access to the main Lake complex. The community center would include a community gathering room, day-care facilities, and other similar spaces.

Concession Housing Areas

Housing for concessioner employees would occur in two areas. The existing TWRS employee housing area would be redesigned to accommodate employees living in substandard and poorly located quarters at Lake Lodge. To accommodate these employees, plus those at Teal

dormitory (20 rooms), a new 60-room dormitory would be constructed at the site of the Teal dorm. An existing cabin or similar-sized quarters would be located in this area to accommodate the hotel's winter maintenance person, and the existing structure used for that purpose would be removed. RV sites in this area would be relocated to make room for employee parking (100 cars), and new RV sites would be provided near the NPS maintenance and housing area. Across Hotel Creek and behind the new service station, two dormitories (55 rooms total) would be constructed, one for HSI employees and one for Yellowstone Park Service Stations (YPSS) employees, along with parking for 85 cars. An employee pub and recreation area would be constructed near the center of the housing area. This facility would include indoor recreation space for basketball, movies, and other activities, besides the pub.

A second concession housing area would be next to and north of the NPS administrative area. This area would be developed with 80 RV sites. Another area, which is already used for mobile homes, would be redeveloped to accommodate an additional 30 RV sites. Over the long term all RV sites would be phased out and replaced with permanent structures. Both developments would be designed, constructed, and managed by the concessioners, with NPS oversight and special emphasis on bear management measures.

Utilities

Utilities at Lake include water, wastewater, electrical, and telephone systems. The National Park Service provides potable water treatment, storage, and distribution, as well as wastewater collection, treatment, and disposal. Electricity and its primary distribution system are provided by the Montana Power Company; the National Park Service is responsible for secondary electrical power distribution. Telephone service is provided by U.S. West Communications. In most instances existing utilities would be used for relocated or replaced facilities. All new utility lines would be buried.

Potable water is obtained from springs and spring collection boxes near Lake, where there are two 500,000-gallon storage tanks and a 250,000-gallon concrete water reservoir. Chlorination is the only treatment applied to raw water. The water meets the standards of the Safe Drinking Water Act for community public water supply systems. New waterlines would be insulated or buried below the normal frost line.

Wastewater from Lake, Bridge Bay, and Fishing Bridge is treated at the Fishing Bridge sewage treatment plant. Sewage from Lake and Bridge Bay is transported by lift stations to Fishing Bridge. The capacity of the Fishing Bridge sewage system is adequate to handle the small increase that would be generated by development actions. Some sewage lift stations would be replaced with new stations to improve system reliability.

ALTERNATIVE A – NO ACTION

Alternative A would continue present facilities, circulation patterns, and activities at the Lake developed area. Current maintenance and planned rehabilitation of existing facilities would continue, including the cabins at Lake Hotel and Lake Lodge. As called for in the Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan*, the service station/ auto repair facility would be moved from Fishing Bridge to a disturbed site near the entrance

to the Lake developed area. The remaining dormitories at Fishing Bridge would be moved to a site behind the new service station.

ALTERNATIVE B

Under alternative B visitors would have opportunities to walk along the lakeshore at the Lake developed area and to enjoy and experience both the natural and cultural resources of the area. Where appropriate and practicable, historic structures would be adaptively used for interpretive or administrative purposes. Opportunities for increased interaction between NPS staff and visitors would be provided. Visitor use areas would be clearly defined and separated from administrative, maintenance, and staff residential areas. The existing Fishing Bridge service station would be upgraded, and a new repair facility would be constructed at Fishing Bridge; this action would be a change from the approved 1988 Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan.*

Access and Circulation

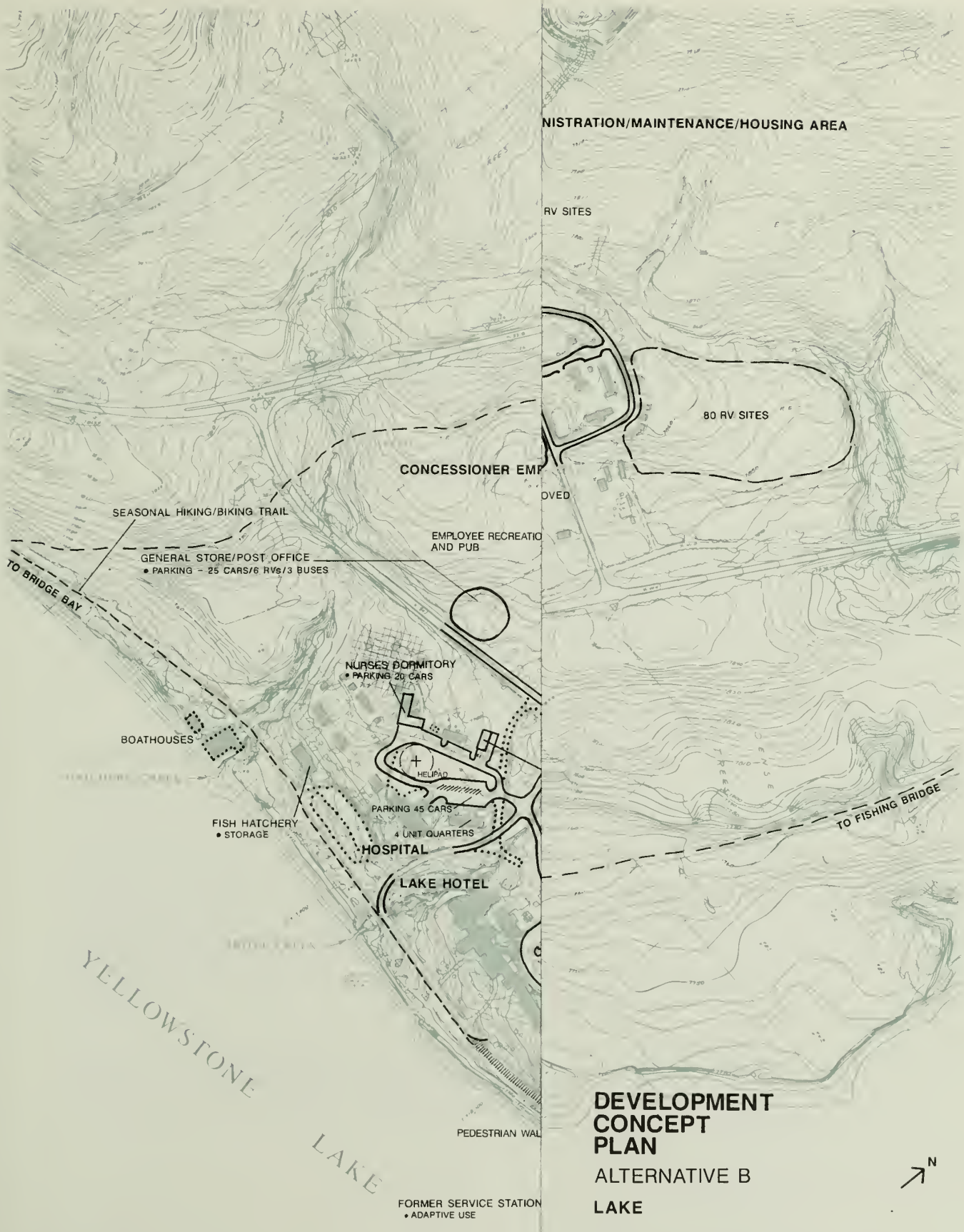
Access to the Lake developed area from the Grand Loop Road would remain the same as now. To improve access to the lakefront, circulation routes within the area would be redesigned to create a main arterial road that would lead to a visitor contact facility on the lakefront at the former general store (see Alternative B map).

Access to the hospital, the USFWS administrative area, and concessioner employee housing would be provided at a clearly marked four-way intersection on the main entrance road. Access to the Lake Lodge would be provided at a clearly marked T-intersection north of the new visitor parking area. The road would end in a vehicle turnaround.

The present lakeshore road from the hotel to the ranger station would be converted to a pedestrian walkway to eliminate conflicts between pedestrians and vehicles. This area would be easily accessible to the mobility impaired. The existing road from the ranger station to Lake Lodge would be converted to a foot trail. A monitoring program would be set up to evaluate and correct shoreline erosion.

The circulation road in the hotel cabin area would be redesigned as a loop to eliminate existing dead-end roads and to facilitate emergency access.

A hiking/biking trail would be developed along the original lakeshore road to link Lake with Bridge Bay. The trail would be adjacent to the existing road and would pass through the Bridge Bay campground and on to Natural Bridge. A designated hiking trail would be constructed to link Fishing Bridge with Lake.



DEVELOPMENT CONCEPT PLAN

ALTERNATIVE B

LAKE

N

YELLOWSTONE NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

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DEVELOPMENT CONCEPT PLAN

ALTERNATIVE B

LAKE

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YELLOWSTONE NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

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Information/Orientation/Interpretation

The general store would be converted for use as a visitor contact facility. This location would provide an outstanding opportunity for on-site interpretation of the cultural and natural features of the Lake area. The visitor facility would contain space for a lobby and sales area, a theater, an exhibit gallery, a special area for children's programs, and office space. Parking would be provided for 150 cars, six RVs, and three buses. As described under the proposed action, interpretation would focus on Yellowstone National Park as the core of the largest intact ecosystem in the temperate zone of the earth.

General Store/Post Office

A new general store and post office would be constructed in the former contractor's camp near the entrance to the Lake developed area. Parking would be provided for 25 cars, six RVs, and three buses. All buildings would be designed to be architecturally compatible with the historic structures at Lake.

Fish Hatchery Historic District

The fish hatchery area would be used as a storage area for the U.S. Fish and Wildlife Service. Three historic structures would continue to be used for USFWS housing, but all trailers and other nonhistoric housing units would be removed, and new housing would be provided in the NPS housing area. The existing dilapidated boathouses would be removed. Boat storage would be provided in the NPS maintenance area. The buildings that contribute to the historic district would be stabilized and rehabilitated to their historic appearance.

Lake Hospital Area

The road to the hospital would be redesigned to clearly lead to the hospital. The walkway to the hospital's main entrance would be posted. The parking area south of the hospital would be removed, and the site would be restored to a natural appearance. A north side parking area for visitors and employees would be redesigned (45 cars). The existing nurses' dormitory would be converted to four housing units. A new dormitory for nurses would be designed to be compatible with the Fish Hatchery Historic District, and parking for 20 cars would be constructed west of the existing hospital quarters. A permanent emergency helipad would be built next to the hospital. The incinerator would be relocated to an area adjacent to the hospital.

A fire station would be constructed in the vicinity of the hospital, and easy access would be provided to the Lake entrance road. The station would include a training room, two truck bays, rescue cache, storage space, and quarters for four employees.

Lakefront Developments

The former service station would be adaptively used, and the surrounding area would be developed into an outdoor plaza for eating or simply resting and enjoying the outdoors. The Hamilton Stores' dormitory behind the general store would be adaptively used as the need arises.

The lakefront area from Lake Hotel to the historic ranger station would be reserved for pedestrian use. Visitors could take a safe, leisurely stroll among the historic buildings and along the lakeshore to enjoy the resources on a first-hand basis.

Lodging and Food Services

Access and circulation improvements for the Lake Hotel would be the same as for the proposed action. Long-term parking (250 cars and 10 RVs) would remain at the rear of the hotel. Circulation in the cabin area would be redesigned as a loop road. As funds became available, the hotel cabins would be consolidated into motel-type lodging units that would be designed in a compatible architectural style. This redevelopment would eventually reduce the size of the cabin area.

To help alleviate conflicts between bears and humans, the Lake Lodge cabins would be consolidated into motel-type buildings of a compatible architectural style and relocated away from Lodge Creek. These larger, less numerous units would greatly reduce the total size of the cabin area. The larger of the two employee dormitories behind the lodge would be retained. The smaller dormitory and the employee pub would be removed, and a small maintenance building and an employee parking area (50 cars) would be constructed.

NPS Administration/Maintenance/Housing Area

Subdistrict offices for NPS administrative personnel would be relocated from the USFWS structure to the administration/maintenance/housing area.

Temporary maintenance shops and buildings would be replaced and would include boat storage and maintenance offices. The existing fire station in the maintenance area would be enlarged or replaced and would serve this area as well as provide backup for the new Lake fire station.

The NPS housing area would be upgraded and expanded to accommodate year-round and seasonal needs for the National Park Service and the U.S. Fish and Wildlife Service. The housing proposals in this plan are intended to make a more livable community for employees, to maximize vehicular and pedestrian access, and to maintain privacy between units. Trailers and substandard structures would be removed and replaced with well-constructed and weatherproofed units. The new units would be more spacious inside, have larger bedrooms, better furnishings, more storage, and work spaces. All units would be designed to take advantage of views, privacy, aesthetics, and solar gain.

As described for the proposed action, 25 two- or three-bedroom units would be needed to accommodate year-round employees, and six existing units would be rehabilitated, with access by a new loop road. An additional 58 efficiency, one-, and two-bedroom units would be needed for seasonal employees, and 33 existing units would be rehabilitated. A total of seven sites for trailers would be provided.

An NPS community and recreation center (including day-care facilities and a playground), picnic area, and an internal trail network would be constructed. A designated foot trail would provide improved pedestrian access to the main Lake complex.

Concession Housing Areas

As described for the proposed action, concessioner employee housing would be located in two areas. For TWRS employees from Lake Lodge, plus those at Teal dormitory (20 rooms), a new 60-room dormitory would be constructed. An existing cabin or similar-sized quarters would be located in this area to accommodate the hotel's winter maintenance person. RV sites in this area would be relocated to make room for employee parking (100 cars), and new RV sites would be provided near the NPS maintenance and housing area. Two dormitories (55 rooms total) would be constructed near the entrance to the housing area, one for HSI employees and one for YPSS employees, along with parking for 85 cars. An employee pub and recreation area would be constructed near the center of the housing area. This facility would include indoor recreation space for basketball, movies, and other activities, as well as the pub.

A second concession housing area would be next to and north of the NPS administrative area. This area would be developed with 80 RV sites. An area that is already used for mobile homes would be redeveloped to accommodate an additional 30 RV sites. Over the long term all of the RV sites would be phased out and replaced with permanent structures. Both developments would be designed, constructed, and managed by the concessioners, with NPS oversight and special emphasis on bear management measures.

Utilities

In most instances existing utilities would be used for relocated or new facilities. All new utility lines would be placed underground. New waterlines would be insulated or buried below the normal frost line. The existing sewage system at Fishing Bridge would be adequate to treat sewage from Lake and Bridge Bay. Some sewage lift stations would be replaced to improve system reliability.

Fishing Bridge

At Fishing Bridge the service station would be retained and brought up to standards. The existing repair facility would be removed, and a new facility (four or five bays) would be constructed behind the service station. This facility would have the capability of servicing RVs and pickup trucks as well as cars.

Alternative B would require an amendment of the Fishing Bridge *Final Environmental Impact Statement.* This alternative was considered because the Fishing Bridge service station is near a major north/south intersection that is easily accessible to visitors, and close to Sylvan Pass and the RV campground, the sources of most service calls. The gas station would continue to occupy prime grizzly bear habitat in the Fishing Bridge area. All other proposals (such as removing the NPS-operated campground and relocating all employee housing to the Lake area) as described in the *Final Environmental Impact Statement / Development Concept Plan* would be implemented.

ALTERNATIVES CONSIDERED BUT REJECTED

Lake is a major development in Yellowstone. The housing of certain protection, interpretation, maintenance, administration, and concession employees at Lake is essential for the proper functioning of this developed area. It is possible that certain employees could be classified as nonessential, but in-park housing would be necessary because the nearest community outside of the park is Cody, Wyoming, which is over 80 miles away. Housing these nonessential employees at Canyon or Grant Village was considered but rejected for a variety reasons. Canyon, 16 miles north of Lake, is also a major development, and any additional employee housing there would necessitate an expansion into an undeveloped area. The area surrounding Canyon is of moderate- to high-quality grizzly bear habitat, based on vegetative measures of habitat quality, and this area is also used by grizzly bears as a travel corridor. Grant Village, 21 miles south of Lake, is on the shore of Yellowstone Lake. There are three spawning streams within the Grant Village developed area, and several others flow into the lake within several miles of Grant Village. A number of these streams are often used by bears during the spawning season, and the bears use the lakeshore as a travel corridor. Special management measures have been in place for a number of years to alleviate potential bear/human conflicts in that location.

In all park administrative areas housing is considerably substandard and does not meet existing health and safety standards. This substandard housing contributes to low employee morale. Existing and projected future housing needs are not being met at Canyon or Grant Village for essential employees in those areas, and planning is underway to improve living conditions in these isolated park communities. Relocating nonessential employees from the Lake/Bridge Bay area to Grant Village or Canyon would require enlarging the existing zone of influence attributable to each of those developed areas, or possibly building a new housing area. Moving Lake area employees to Grant Village or Canyon would also result in additional resident traffic on the roads between the housing area and Lake. When compared with the impacts of building necessary housing in the existing zone of influence at the Lake housing area, the alternative locations were not viewed as a positive trade-off for grizzly bears or for improved employee living and working conditions.

YELLOWSTONE NATIONAL PARK

PELICAN VALLEY

To East Entrance

PELICAN CREEK

TO BE CONSTRUCTED

TO BE REMOVED

North

0 200 400 600 Feet

ALTERNATIVE B
FISHING BRIDGE

YELLOWSTONE NATIONAL PARK / WYOMING · MONTANA · IDAHO

UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE

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YELLOWSTONE NATIONAL PARK

TO BE CONSTRUCTED

TO BE REMOVED

North

0 200 400 600 Feet

ALTERNATIVE B
FISHING BRIDGE

YELLOWSTONE NATIONAL PARK / WYOMING MONTANA · IDAHO

UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE

DSC / MAR 90 / 101-40254

Two alternatives are considered for Bridge Bay. The proposed action would recommend rehabilitating the campground, improving circulation routes, and upgrading marina facilities; the visitor experience at Natural Bridge would also be improved. Alternative A would continue existing conditions (no action).

PROPOSED ACTION / DEVELOPMENT CONCEPT PLAN

Campground

The amphitheater, comfort stations, and campsites would be rehabilitated as necessary to correct functional and aesthetic problems. Circulation routes would be improved, and vegetation would be planted between sites for separation and a more pleasant setting. The campground registration area would be redesigned to improve registration efficiency and eliminate long waiting lines. A monitoring program would be conducted at Bridge Bay to develop bison management strategies.

The residence at the ranger station would be converted to accommodate visitor needs, including visitor information/orientation and backcountry permit distribution. A new residence would be built near the ranger station.

A new laundry and shower facility would be added to the camper services building or elsewhere in the campground. Additional shower facilities, if needed, would be located in redesigned comfort stations throughout the campground.

Specific details for site rehabilitation and the redesigned registration area would be determined in a comprehensive design of the campground to be undertaken when funding permitted.

Marina

The marina bulkhead would be repaired. A new pump would be installed at the sewage dump station at the marina to service self-contained boats. The fuel storage area would be made smaller and moved nearer the fueling dock area. Diesel fuel would be provided.

As part of marina maintenance, the mouth of Bridge Bay would be dredged as needed to allow safer boat passage into and out of the bay. How frequently dredging would be required is not known at this time. Dredging operations would require consultation with the U.S. Army Corps of Engineers to ensure compliance with section 404 of the Clean Water Act.

The boat repair shop would be expanded to provide work space for larger boats. Short-term boat trailer storage (up to one week) would remain in the parking area.

Long-term storage would be moved to the transfer station, where a locked chain-link fence and other measures as required would provide security. This would alleviate the need for additional slips. Boat storage would be separate from the NPS garbage storage area because of bear

management requirements. The transfer station would be screened with vegetation to obscure it from the Grand Loop Road and the campground.

The interior of the marina ranger station would be redesigned to improve efficiency.

General Store

The marina and camper concession service store would be modified or expanded on the current site to give additional sales space for camper and boating supplies. A pedestrian walkway would be constructed from the parking area around the east side of the building. Service access to the store would be improved, and a fence or screen would be constructed to visually block the sight of service vehicles from the public.

Utilities

Water to Bridge Bay is provided from the Lake area. A larger water distribution line at Bridge Bay would be installed to ensure adequate fire protection. The new line would be insulated or buried below the frost line.

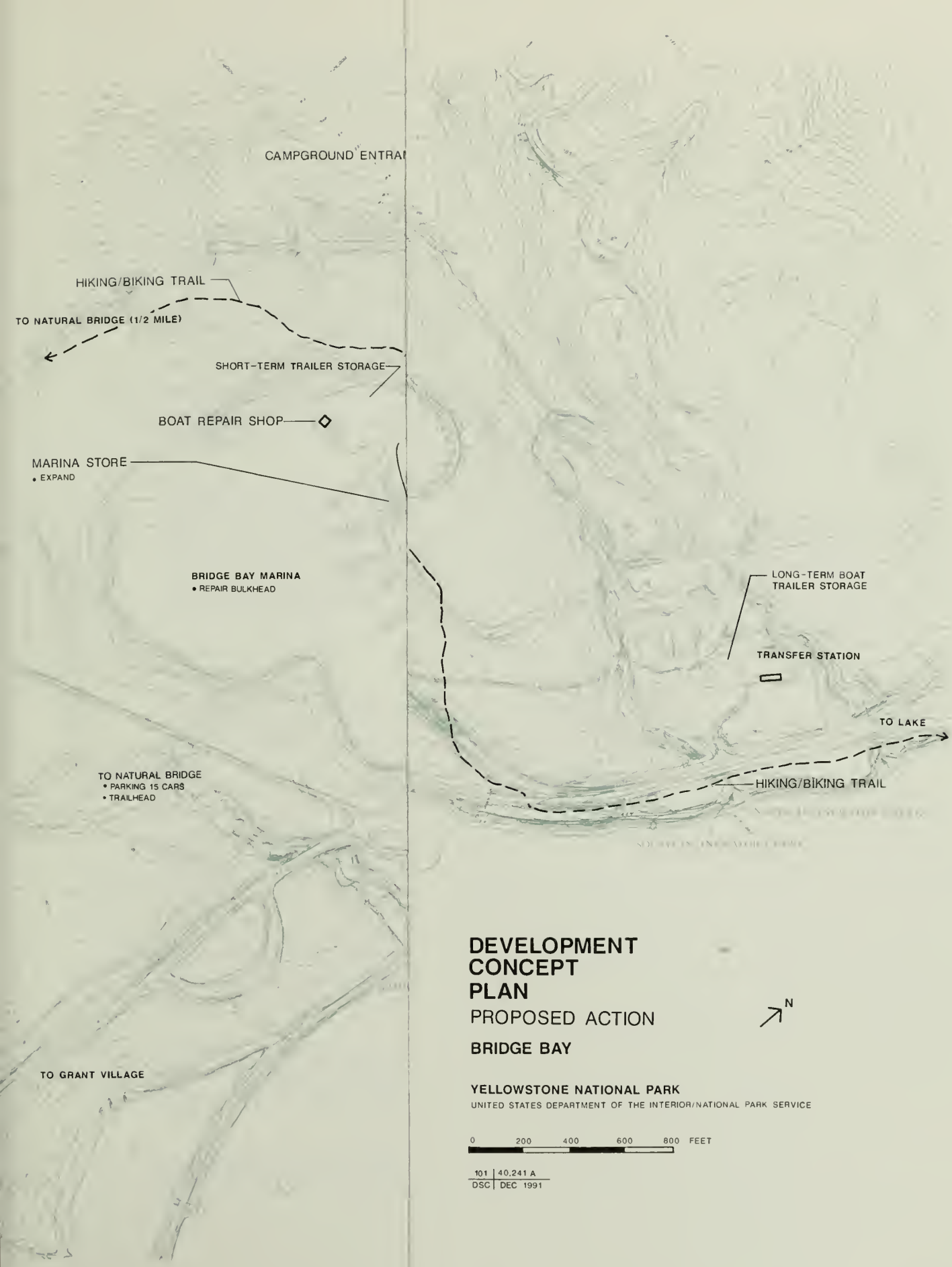
Wastewater would continue to be pumped to Fishing Bridge for treatment. Emergency power equipment or overflow tanks would be installed at the campground lift stations, and one station would be replaced to improve system reliability.

Natural Bridge

The road to Natural Bridge would be closed to public traffic, but it would still be used for administrative access to the borrow pit. Once the borrow pit was closed and the area rehabilitated, the road would be closed to all vehicular traffic, the area revegetated, and a walking/bicycling trail would be developed. A trailhead at Grand Loop Road would be developed with parking (15 cars) and an interpretive exhibit to facilitate use of this trail. Disturbed areas along the road would be restored to a natural appearance and conditions, and current erosion problems would be corrected.

ALTERNATIVE A – NO ACTION

At Bridge Bay the campground and marina facilities would continue under present conditions. As part of marina maintenance, the mouth of Bridge Bay would be dredged as needed to allow safer boat passage into and out of the bay. How frequently dredging would be required is not known at this time. Dredging operations would require consultation with the U.S. Army Corps of Engineers to ensure compliance with section 404 of the Clean Water Act. At Natural Bridge present conditions would continue.



DEVELOPMENT CONCEPT PLAN

PROPOSED ACTION

N

BRIDGE BAY

YELLOWSTONE NATIONAL PARK

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

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CAMPGROUND ENTRANCE

HIKING/BIKING TRAIL

TO NATURAL BRIDGE (1/2 MILE)

SHORT-TERM TRAILER STORAGE

BOAT REPAIR SHOP

MARINA STORE
• EXPAND

BRIDGE BAY MARINA
• REPAIR BULKHEAD

RANGER RESIDENCE

CAMPGROUND REGISTRATION/
RANGER STATION

CAMPGROUND
• CAMPSITES TO BE REHABILITATED

LAUNDRY/SHOWER

AMPHITHEATER

PICNIC
AREA

TO NATURAL BRIDGE
• PARKING 15 CARS
• TRAILHEAD

APPROXIMATE AREA TO BE DREDGED

TO GRANT VILLAGE

YELLOWSTONE LAKE

LONG-TERM BOAT
TRAILER STORAGE

TRANSFER STATION

TO LAKE

HIKING/BIKING TRAIL

EXISTING
BUILDING
PAVED ROAD

PROPOSED
BUILDING
PAVED ROAD
TRAIL
FACILITY REMOVED

DEVELOPMENT CONCEPT PLAN

PROPOSED ACTION

N

BRIDGE BAY

YELLOWSTONE NATIONAL PARK
UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

0 200 400 600 800 FEET

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ACTIONS TO REDUCE OR ELIMINATE ADVERSE IMPACTS ON THREATENED OR ENDANGERED SPECIES

The threatened grizzly bear is resident in the Lake and Bridge Bay areas. To reduce or eliminate the impacts on grizzly bears from the continued use and modest expansion of facilities, numerous design and management actions are proposed. These actions would be taken regardless of the alternative that is selected, and they would help ensure the population's survival. While some actions would be implemented immediately, other actions would be phased in over time, and some would be subject to available funding.

Education-based actions:

The education efforts directed toward all employees working in the area would be continued. The National Park Service would work closely with supervisors of area employees to ensure compliance with bear closures or other bear management regulations.

Educational efforts would be directed towards visitors by providing knowledgeable staff at the Fishing Bridge visitor center beginning the Memorial Day weekend. Additional signs would be provided on trails in the Lake, Bridge Bay, and Natural Bridge areas to tell people about bear/human conflicts and to convey safety messages. Information would also be available in the lobbies of the Lake Hotel, Lake Lodge, and at other appropriate locations.

Use-based actions:

Opening dates and operating hours for visitor facilities that affect bear use of trout-spawning streams would be established annually, based on current and evolving resource data and visitor needs.

Annual visitor use of the Lake Lodge and cabins would not begin before June 10. Visitor use prior to the annual opening date, including that for special groups or conferences, would be prohibited. The lodge cabins would be phased into use, with those cabins adjoining Lodge Creek (in the vicinity of the J loop) not open for public use until June 20 each year.

To help alleviate conflicts between bears and humans, the Lake Lodge cabins would be consolidated into motel-type buildings and located away from Lodge Creek. This action would begin within the next 10 years, and the concessioner's capital improvement and maintenance fund monies would be used.

The use of the G, H, and I loops (and other loops as necessary) in the Bridge Bay campground would be delayed until June 15 annually, and longer when warranted by bear activity. Advance reservation of campsites in these loops would not be permitted until after the end of the trout-spawning season.

The spawning streams in the Lake and Bridge Bay areas are now and would continue to be closed to human entry when warranted by bear activity.

Trails from the Lake area to Bridge Bay and to Fishing Bridge are now and would continue to be closed when warranted by bear activity. Inappropriate or unnecessary social trails in the area would be closed and rehabilitated.

During road reconstruction studies all bridges and culverts would be assessed for their effects on grizzly bears. Where appropriate, culverts or bridges would be designed to accommodate the passage of bears beneath the roadways.

At all locations where food is commercially prepared or served, and at the concessioner's stores at Lake and Bridge Bay, bear-proof food and garbage storage facilities would be provided. At all other residential and overnight lodging areas bear-proof garbage containers would be provided. At the Bridge Bay transfer station an improved gate or storage system for the garbage packers would be installed.

The Otter Creek administrative area, near the north end of Hayden Valley, would be rehabilitated and restored to its natural condition, when funds are available. This action would return approximately 3.5 acres of high-quality habitat to the grizzly bear in the bear management unit that also encompasses the Lake/Bridge Bay areas.

The Little Thumb Creek service road and former gravel quarry would be rehabilitated and restored to its natural condition. A proposal to acquire funds is being prepared for this purpose. This would restore approximately 11.5 acres of natural, high-quality grizzly bear habitat. Little Thumb Creek is a cutthroat trout-spawning stream that has spawning fish in its undisturbed lower segment and experiences grizzly bear fishing activity. Restoration of the stream channel and surrounding disturbed area, combined with the elimination of administrative access, would return this high-value area to the grizzly bears in the bear management unit that also encompasses the Lake/Bridge Bay developed areas.

The road to Natural Bridge and beyond to the boat trailer storage area has been closed to public traffic. After a new boat trailer storage area is built and the borrow pit has been rehabilitated, the road corridor would be revegetated, and a hiking/bicycling trail would be provided when bear activity does not preclude its use. This action would return approximately 9.5 acres to natural conditions.

The Sand Point picnic area and beach would be closed when bear activity warrants to reduce overall impacts on bears within the ecosystem.

Throughout the Lake, Bridge Bay, and Fishing Bridge areas, late-night bear patrols would be continued, and when necessary due to bear activity, an all-night bear patrol would be implemented, when funds are available.

To implement these and other bear management actions, additional personnel would be assigned as necessary to accomplish spawning surveys, bear monitoring, and aversive conditioning, and to assist with bear handling and crowd control. This action would require additional funding.

A comprehensive vegetation rehabilitation plan for the Lake and Bridge Bay areas would be implemented.

Table 1: Summary of Impacts

	Lake			Bridge Bay	
	Proposed Action	Alternative A (No Action)	Alternative B	Proposed Action	Alternative A (No Action)
Natural Environment	• Total disturbance of ±24.5 acres of soil and vegetation (lodgepole pine, grasses) — 10.5 acres previously disturbed, 14 acres of new disturbance • Revegetation/restoration of 9 acres within the development zone • Potential effect on the grizzly bear population; consultation with U.S. Fish and Wildlife Service underway (sec. 7, Endangered Species Act) • Restoration of ±24.5 acres of grizzly bear habitat at Otter Creek, Little Thumb Creek, and Natural Bridge • Minor air and water quality impacts	• Continued soil compaction and impacts on vegetation in high visitor use areas • Disturbance of ±1.5 acres previously disturbed soil and vegetation due to relocation of Fishing Bridge facilities • Potential effect on the grizzly bear population; consultation with U.S. Fish and Wildlife Service underway (sec. 7, Endangered Species Act) • Minor air and water quality impacts	• Total disturbance of ±30 acres of soil and vegetation (lodgepole pine, grasses) — 16 acres previously disturbed, 14 acres of new disturbance • Revegetation/restoration of 10 acres within the developed area • Potential effect on the grizzly bear population; consultation with U.S. Fish and Wildlife Service underway (sec. 7, Endangered Species Act) • Restoration of ±24.5 acres of grizzly bear habitat at Otter Creek, Little Thumb Creek, and Natural Bridge • Minor air and water quality impacts	• Total disturbance of ±1 acre of soil and vegetation (lodgepole pine, grasses) • Potential effect on the grizzly bear population; consultation with U.S. Fish and Wildlife Service underway (sec. 7, Endangered Species Act) • Some temporary short-term disturbance to aquatic organisms from dredging • Trail erosion problems reduced at Natural Bridge	• Continued soil compaction and trampled vegetation in high visitor use areas • Potential effect on the grizzly bear population; consultation with U.S. Fish and Wildlife Service underway (sec. 7, Endangered Species Act) • Some temporary short-term disturbance to aquatic organisms from dredging
Cultural Resources	• No inadvertent adverse effects because of monitoring of archeological resources during construction activities • Historic structures traditionally or adaptively reused and maintained	• No inadvertent adverse effects because of monitoring of archeological resources during construction activities	• Same as proposed action • Historic boathouse documented in accordance with NPS-28 and National Historic Preservation Act and removed	• No inadvertent adverse effects because of monitoring of archeological resources during construction activities	• Same as proposed action

	Lake			Bridge Bay	
	Proposed Action	Alternative A (No Action)	Alternative B	Proposed Action	Alternative A (No Action)
Visitor Use	• Enhanced interpretive programs • Improved visitor services and facilities • Decreased confusion in finding facilities and services • Some continued conflicts between pedestrians and vehicles along the lakeshore	• Continued confusion for visitors because of present road circulation routes • Continued conflicts between pedestrians and vehicles along lakeshore drive • Inadequate interpretive programs for visitors	• Enhanced interpretive programs • Improved visitor services and facilities • Decreased confusion in finding facilities and services • No vehicle/pedestrian conflicts along lakeshore	• Less congestion, faster campground check-in with redesigned entrance • More pleasant stays because of improved campsites and laundry/shower facilities • Needs of boating visitors met as a result of an expanded repair area, increased long-term storage space, and deeper bay entrance • Visitors better served with larger marina store • At Natural Bridge more pleasant visitor experience because disturbed areas restored to natural conditions, and improved trailhead parking	• Delays anticipated for visitors at campground registration • Crowded marina store at peak times • Less-than-optimum camping experience because of deteriorated sites and trampled vegetation • At Natural Bridge limited visitor experience
Concessioners	• Improved and expanded access to general store • Direct access for visitors to service station/auto repair facility • Improved access to post office and hospital	• Direct access for visitors to service station/auto repair facility	• Improved sales for general store operation • Direct access for visitors to post office and hospital	• More efficient marina and marina store	• No change for concessioner
Management and Operations	• More efficient maintenance operations • Additional staff required • New, efficient service facilities easier for visitors to find • NPS and concessioner housing needs satisfied; enhanced employee morale • Improved fire and safety response	• Continued cramped and poorly designed maintenance facilities • Continued substandard housing	• Same as proposed action	• More efficient campground registration operations • Adequate space for ranger operations and greater privacy for ranger during off-duty hours	• Inefficient campground registration and continued congestion • Insufficient space for ranger station operations; limited privacy for ranger

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Yellowstone Lake

The Lake and Bridge Bay developed areas are along the northwest shore of Yellowstone Lake, between the Yellowstone Plateau and the Absaroka Range. Both areas are surrounded by the park's natural zone, where the management emphasis is the conservation of natural resources and the compatible use of these resources.

SOILS AND VEGETATION

Description

The soils of Yellowstone are relatively young and were formed from loess, drift, alluvium, or insolifluction deposits that are mostly from the late Pleistocene or Holocene epoch. They are moderately acidic, have a moderate to high saturation level, and low water-holding capacity.

Site-specific soil information is lacking for Lake and Bridge Bay, but a recent soil study characterizes major kinds of soils in Yellowstone National Park (Trettin 1986). Soils in the general Lake and Bridge Bay areas were identified as rhyolitic till and lake sediments that are characterized by coarse-loamy sand and mixed subsoils 1 to 2 meters thick. The soils are well drained on strongly sloping to gently sloping topography, with gradients up to 15%. Along the shoreline of Yellowstone Lake wave action and possible sheet wash have caused considerable erosion. Visitors trying to gain access to the shoreline also accelerate the process by using these erosion channels. Several culverts and pipes that have heavy runoff also contribute to slope erosion.

Vegetation classifications for Yellowstone have been developed in a detailed habitat and cover type study (NPS, Despain 1985a). Thirty-six cover types and 19 forested and 18 nonforested habitat types were defined. Habitat types are based on physical conditions of a site (soil, water, topography, light, etc.) and the expected climax community. Cover types (overstory vegetation) are indicated by the main stand structure — forested or nonforested.

The Lake area's vegetation is a mosaic of forested and nonforested habitat types. In general the forested areas are classified as a wet forest habitat type with a lodgepole pine overstory and an understory including lodgepole pine, subalpine fir, Engelmann spruce, and whitebark pine. Understory shrubs include grouse whortleberry, huckleberry, and honeysuckle. The forest floor is usually wet, dominated by a variety of species including bluejoint reedgrass, pinegrass, arnica, and glacier lily.

The nonforested areas are generally classified as a tufted hairgrass/sedge habitat type, and this makes up the major portion of the Lake area. This type grows on poorly drained soils in drainages where silts and organic matter have accumulated. Tufted hairgrass dominates, with a variety of associated sedge species. Less abundant species include camus, asters, and cinquefoils.

The Bridge Bay area's vegetation is primarily within the forested zone and is classified as wet forest habitat with a lodgepole pine overstory and an understory species composition similar to that at Lake. The extreme east end of the Bridge Bay area is partially in the nonforested

zone, with sedge bogs and wet areas. At the periphery of this zone are the tufted hairgrass/ sedge and wet forest habitat types.

Several exotic plant species, including butter-and-eggs and spotted knapweed, have been identified in the Lake and Bridge Bay areas.

No plant species listed as threatened or endangered are known to occur within the park.

Impacts at Lake

Proposed Action. The emphasis of the proposed action would be to adaptively use existing buildings, modify existing roads and parking areas, and channel new development into previously disturbed areas. Nevertheless, this alternative would result in some road construction for access, parking, and circulation, along with new facility construction and trail development. These actions would cause both temporary and permanent disturbance, displacement, and removal of surface soils. Construction activities would also cause both temporary and permanent soil compaction, which could result in greater runoff and some minor soil erosion. Selected lodgepole pines and grasses would be disturbed or permanently removed.

The redesign of the lakeshore road in front of the general store as a separated pedestrian trail and vehicular roadway would make use of a previously disturbed area and would not result in any additional impacts to soils and vegetation. Natural erosion along the shoreline would continue but would be monitored and corrected when necessary.

Permanently covering soils with new road segments, parking areas, and facilities would result in the loss of water infiltration to the underlying soil areas. Runoff would be diverted to the surrounding areas, and adjacent ground cover could increase, thereby reducing erosion potential.

Relocating the Fishing Bridge service station/auto repair facility to a previously disturbed site near the entrance to Lake would increase use and soil compaction in that area, resulting in some degradation of soil and vegetation.

Ground-disturbing activities can provide a seedbed for the establishment of nonnative plant species. Monitoring and control actions may be necessary. Long-term landscaping and revegetation using native plant materials would return disturbed areas to a more natural and aesthetic setting.

Redesigning the access road to the Lake Hotel, redesigning parking areas, and constructing facilities (including a service station/auto repair facility, employee housing and recreation facilities, and concessioner housing) would disturb approximately 24.5 acres of coarse-loamy soils and wet forest habitat. Of this total, approximately 10.5 acres are within the current development zone and have been previously disturbed, while approximately 14.0 acres are on the periphery of the development and would extend the area of disturbance. Removing existing road segments and scattered buildings, consolidating the Lake Lodge cabins, and using native plant materials to return sites to more natural conditions would restore approximately 9 acres to natural conditions.

Impacts to soils and vegetation would be minor in the short term. However, over time soils in any high visitor use area would gradually deteriorate as a result of compaction and erosion, and vegetation could be adversely affected by exposed roots and dieback.

Alternative A (No Action). Under alternative A continued use of existing access roads and trails would not result in any new disturbance to soils and vegetation. Soils would continue to be compacted, resulting in reduced water infiltration, vegetation trampling, and tree root damage in high visitor use areas. Relocating the Fishing Bridge service station/auto repair facility to a previously disturbed site near the entrance to Lake, and the remaining concessioner housing to a site behind this facility would disturb approximately 1.5 acres of previously disturbed ground and would increase use and soil compaction in that area, resulting in some degradation of soil and vegetation.

Alternative B. Under alternative B there would be more extensive construction of new roads, parking, circulation, and facilities, causing both temporary and permanent disturbance to soils and vegetation. Realigning the access road to the lakefront, redesigning parking lots, and constructing new administrative facilities, employee housing, and concessioner housing would disturb approximately 30 acres of coarse-loamy soils and wet forest habitat. Of this total, approximately 16 acres are within the current development zone and have been previously disturbed, while approximately 14 acres are on the periphery of the development and would extend the area of disturbance. Removing existing road segments and scattered buildings, consolidating the Lake Lodge cabins, and using native plant materials to return sites to more natural conditions would restore approximately 10 acres to natural conditions.

Under alternative B the types of impacts to soils and vegetation would be similar to those described for the proposed action.

Impacts at Bridge Bay

Proposed Action. Improving the Bridge Bay campground by rehabilitating the 420 campsites, improving circulation, and constructing additional visitor services and administrative facilities, would result in some permanent disturbance, displacement, and removal of surface soils and vegetation. Selected tree and ground cover removal would affect approximately 0.5 acre. Overall impacts to soils and vegetation would be light to moderate, and there would be no significant short- or long-term effects.

Expanding the marina store and boat repair shop and constructing a pedestrian walkway, vehicle service ramp, laundry/shower facility, a new ranger residence, and roads would disturb soils and vegetation within and outside existing disturbed areas. Soils would be compacted and covered, thus reducing soil moisture and increasing runoff and resultant erosion. Selected trees would be removed. Overall impacts to soils and vegetation would not be significant in the short or long term.

Trail development in the Natural Bridge area would correct present erosion problems and improve the appearance of the area. Restoring and revegetating disturbed areas within and adjacent to the Natural Bridge area would return approximately 9.5 acres to natural conditions. There would be no long-term adverse effects on soils and vegetation.

Alternative A (No Action). Under alternative A continued use of existing roads and trails would not result in any new disturbance to soils and vegetation. Soils would continue to be compacted in high visitor use areas, which could result in the gradual deterioration of soils and vegetation from visitor trampling and heavy site use.

WATER RESOURCES/WATER QUALITY

Description

Yellowstone National Park encompasses a 3,500-square-mile watershed that provides the surrounding area with high-quality water. The water resources within Yellowstone cover 112,000 acres and consist of over 600 streams (totaling some 3,700 miles) and 150 lakes (totaling approximately 108,000 surface-acres). Yellowstone Lake, the largest body of water above 7,500 feet elevation in North America, has a 110-mile shoreline, occupies 139 square miles, and has a maximum depth exceeding 390 feet. Other major lakes in the park are Shoshone, Lewis, and Heart. These four water bodies account for 94% of the park's lake surface. Fifteen tributaries flow into Yellowstone Lake from Fishing Bridge south to Sand Point.

Surface water and subsurface aquifers in both the Lake and Bridge Bay areas appear to exhibit nearly pristine water quality, except in the immediate vicinity of the Bridge Bay boat and gas docks.

Impacts at Lake

Proposed Action. Construction activities would result in minor impacts to creeks in the Lake area and to Yellowstone Lake. Constructing roads and parking areas would cause increased runoff to adjacent drainages, and minor chemical and petroleum leaks and spills on paved surfaces could seep into the groundwater table and wet meadow areas. Overall impacts would be minor and would not result in any adverse effects on the area's water resources.

Alternative A (No Action). Continued operations at Lake would not result in any additional impacts to water resources.

Alternative B. Development and improvement activities would be similar to those described for the proposed action. Overall impacts would be minor and would not result in any adverse effects on the area's water resources.

Impacts at Bridge Bay

Proposed Action. Repairing the marina bulkhead and dredging would temporarily cause turbidity and reduce water clarity. Daily water currents would regularly flush out and clear the muddy water. About 2,400 cubic yards of lake bottom at the mouth of Bridge Bay would be dredged initially to allow for safe boat passage. Some temporary and short-term disturbance to aquatic organisms, potability, and aesthetics would occur. Overall there would be no significant long-term effects on water quality. Dredged material from Bridge Bay would be disposed of in a highland area of the park and away from Yellowstone Lake, as long as the

material did not have any qualities that would require disposal outside the park (for example, heavy metal residue). Dredged material could also be used to revegetate scarred areas. Constructing roads and parking areas would cause increased runoff to adjacent drainages, and minor chemical and petroleum leaks and spills on paved surfaces could seep into the groundwater table and wet meadow areas. Overall impacts would be minor and would not result in any adverse effects on the area's water resources.

Alternative A (No Action). Alternative A would have no additional effects on water quality at Bridge Bay. Erosion along the trail at Natural Bridge would continue, possibly increasing sediment levels in local streams.

FLOODPLAINS/WETLANDS

Description

No floodplains in either the Lake or Bridge Bay area have been identified.

The park's recently completed parkwide vegetation classification system identifies general wetland types. In the Lake/Bridge Bay area the primary wetland type is the wet meadow/sedge marsh. Approximately 40 acres of this wetland type have been identified in each area. Principal species are tufted hairgrass, pine grass, and bluejoint reedgrass. Wetlands containing predominantly wet meadows (tufted hairgrass) are seasonally saturated, while sedge marsh areas tend to be saturated all the time. These wetlands are generally on poorly drained soils where silt and organic matter accumulate. They are considered poor habitat for waterbirds due to the lack of standing water.

Impacts at Lake

Proposed Action. Most of the development in the NPS housing area would be confined to the existing developed area except where the loop road passes over the ridge on the west edge of the development. The area below this ridge is periodically wet. Adverse impacts to this area would be reduced by constructing a culvert. A wetlands inventory of this area has been completed, and all construction sites would avoid areas identified as wetlands. The new service station complex would be in an already disturbed area; a wetland identified in the park vegetation classification system does occur east of this site. Care would be taken so that the service station complex would have no effect on this wetland. No adverse affects on other wetland areas are expected.

Alternative A (No Action). There would be no impacts on wetland areas under this alternative. The new service station complex would be in an already disturbed area; a wetland identified in the park vegetation classification system does occur east of this site. Care would be taken so that the service station complex would have no effect on this wetland.

Alternative B. Impacts would be similar to those described for the proposed action, except that the service station/auto repair facility would be at Fishing Bridge. Because the facility would be built in an already disturbed area, there would be no potential for impacts on wetlands.

Impacts at Bridge Bay

Proposed Action. To avoid impacts on wetlands, the spoil/dredge material from the mouth of Bridge Bay would be placed upland above the high water level.

Alternative A (No Action). There would be no impacts to wetlands under this alternative.

AIR QUALITY

Description

Under the Clean Air Act, as amended, Yellowstone National Park is a mandatory class I area, where air quality degradation is not acceptable. This classification requires direct affirmative responsibility to protect the air quality related values (including visibility).

No significant air pollution sources occur near the park. Human-related sources of pollution in the park include motor vehicles, campfires, wood stoves, and boilers for generating hot water and steam.

Special congressional appropriations in 1986 and 1987 allowed for the addition of new class I visibility monitoring network sites and pollutant monitoring programs, including Yellowstone National Park. There is an air quality monitoring station at Lake that includes visibility monitoring and is a part of the IMPROVE network studying particulates, ozone, and other pollutants.

Primary pollutants in the Lake and Bridge Bay areas are gaseous emissions from vehicles and RVs. Estimates of carbon monoxide at Fishing Bridge in 1975 and 1978 indicate concentrations of less than 0.03% of the national ambient air quality standard for carbon monoxide. Therefore, one can assume only minimal effects on local air quality.

Impacts at Lake

Proposed Action. The proposed action would not result in any additional air quality impacts. Vehicle emission particulates would be present during construction activities, but this would be a minimal inconvenience, and impacts would be temporary. Short- and long-term effects would not occur in measurable quantities.

Alternative A (No Action). There would be no additional air quality impacts.

Alternative B. Alternative B would not result in any additional air quality impacts. There would be no short- or long-term effects in measurable quantities.

Impacts at Bridge Bay

Neither the proposed action nor alternative A (no action) would result in any additional impacts on air quality.

WILDLIFE

Description

Yellowstone Lake and its tributaries support both native and introduced fish. Native Yellowstone cutthroat trout spawn in at least 10 of the 15 streams that flow into Yellowstone Lake from Fishing Bridge south to Sand Point (Streams 1204, 1203 [Lodge Creek], 1202 [Hotel Creek], 1201 [Hatchery Creek], 1200, 1199 [North Incinerator Creek], 1198 [Wells or South Incinerator Creek], 1197 [Bridge Creek], 1192 [Weasel Creek], and 1191 [Sand Point Creek]). The only other native fish species in the lake is the longnose dace. Introduced species include the lake chub, longnose sucker, and redside shiner. This mixture of native and nonnative species is a primary food source for birds, otters, and grizzly and black bears. The tributaries directly within and adjacent to the Lake and Bridge Bay areas are primarily used for spawning by native cutthroat trout.

There is a wide variety of birdlife. Terrestrial birds include the common snipe, cliff swallow, mountain chickadee, mountain bluebird, ruby-crowned kinglet, robin, red-winged blackbird, pine siskin, various warblers, and sparrows. Aquatic species include the trumpeter swan, white pelican, Canada goose, California gull, sora, and a variety of ducks. Raptors include the osprey, bald eagle, Swainson hawk, and great gray owl. Three species are listed as endangered — the bald eagle, whooping crane, and peregrine falcon; potential impacts on these species are described separately below. Other species requiring active management in the Yellowstone Lake area include the osprey, Canada goose, trumpeter swan, white pelican, California gull, Caspian tern, and double-crested cormorant. Trumpeter swan habitat is typically characterized by still or slow-flowing water. Wintering trumpeter swans occasionally use the shoreline area between Fishing Bridge and Lake, primarily between October and December.

Ungulate species include the bison, moose, elk, and mule deer. Scattered bison are seen in the flat meadow areas of Lake and Bridge Bay. Moose are often seen in wet areas in the Bridge Bay vicinity and in wet areas near Lake and along the shoreline. Elk and mule deer are often seen in the meadows around Yellowstone Lake. Other mammals common to the area include the black bear, grizzly bear, coyote, marten, river otter, and rabbits. (The threatened grizzly bear and potential impacts to it are described separately below.) The rodent population consists of pocket gophers, mice, squirrels, muskrats, and beavers. Reptiles and amphibians, such as bull and garter snakes and chorus and spotted frogs, are present as well.

Three subpopulations of bison exist in Yellowstone National Park. Bison herds from the Pelican Valley and Mary Mountain subpopulations roam in the Lake/Bridge Bay area, although neither area is within the bison's main summer or winter range. Lone bulls are most likely to enter the Lake/Bridge Bay area, with as many as a half dozen individuals present during summer and winter. The vegetative mosaic of the Bridge Bay area provides excellent forage. As a result, human/bison conflicts occur, especially in the lower loops (A and B) of the Bridge Bay campground. In recent years several human/bison conflicts have been reported annually at Bridge Bay, and as a result one or more wandering bulls are removed from the area each summer. Reported parkwide human/bison conflicts have been as high as 12 per year. Two fatalities have occurred in the past 20 years.

Yellowstone contains suitable habitat for the federally listed endangered gray wolf, but no individual wolves are known to be active in the park at this time.

Impacts at Lake

Proposed Action. Construction and restoration activities would temporarily displace various small resident birds and mammals. A few bison, elk, and deer in the Lake Lodge area could also be temporarily disturbed. These large grazing animals generally have become habituated to the presence of humans, and their responses are variable and unpredictable. Overall, summer visitors have no measurable effect on any of the large grazing animals, except for an occasional habituated bison that becomes dangerous and has to be destroyed. Any impacts on trumpeter swans would be controlled by restricting people to existing roads and trails.

Overall impacts to wildlife populations would be minor, and there would be no significant short- or long-term effects.

Alternative A (No Action). Under alternative A there would be no increased impacts on wildlife.

Alternative B. Impacts on wildlife populations would be similar to those described for the proposed action, with temporary disturbance of various small resident birds and mammals, as well as bison, elk, and deer. Under alternative B overall impacts to wildlife populations would be minor, and there would be no significant short- or long-term effects.

Impacts at Bridge Bay

Proposed Action. Impacts on wildlife at Bridge Bay would be similar to those described for Lake. Human/bison conflicts, especially in campground loops A and B, would probably not change. Reducing grassy ground cover in high visitor use areas could limit bison use and thereby reduce the potential for such confrontations.

Alternative A (No Action). There would be no increased impacts on wildlife, other than temporary displacement of birds and mammals as a result of continued human presence.

ENDANGERED SPECIES — WHOOPING CRANES, PEREGRINE FALCONS, AND BALD EAGLES

Description

Three bird species listed under the provisions of the Endangered Species Act of 1973, as amended, are present in Yellowstone National Park. They are the the whooping crane *(Grus americana),* peregrine falcon *(Falco peregrinus),* and the bald eagle *(Haliaeetus leucocephalus).*

Whooping cranes and peregrine falcons are summer migrants in Yellowstone. The whooping crane population in the greater Yellowstone ecosystem is centered around Gray's Lake National Wildlife Refuge in Idaho. In 1975 a second wild, self-sustaining flock of whooping cranes was established here. There is historical evidence of whooping cranes nesting in Yellowstone, but information for the park is sketchy and does not constitute a legitimate nesting record. At present the park's whooping crane population rarely, if ever, exceeds two

individuals. These cranes summer in the southern half of the park. Whooping cranes are not documented to have been present in the Lake/Bridge Bay area, which would not be a suitable nesting area.

The peregrine falcon resides in Yellowstone from April through October, nesting on large cliffs that overlook rivers or valleys. An interagency working group is implementing the 1984 recovery plan for the Rocky Mountain population. This plan calls for determining and maintaining suitable habitat, monitoring and maintaining productivity of wild pairs, and restoring breeding populations where necessary. Preliminary surveys for peregrines and suitable habitat began in 1982; hacking (peregrine reintroduction) began in 1984. In 1987 surveys and monitoring of reintroduced birds revealed that suitable sites were being naturally reoccupied in the park. Thus, hacking ceased after 1988 because the habitat was thought to be saturated. Known peregrine aeries in the park increased from one in 1984 to six in 1990. Peregrines are occasionally found in the vicinity of the Lake and Bridge Bay developed areas, where open meadows and lakeshore habitats are used as foraging areas, but no aeries are found near these developments. The proposed actions would occur far from peregrine aeries and suitable nesting habitats, and the birds could continue to forage on prey in the open areas of the developments.

Bald eagles are both year-round residents and migrants in Yellowstone, and they are found throughout the park. Nesting sites occur primarily along the margins of Yellowstone Lake, but none occur in the vicinity of the Lake/Bridge Bay developed area. Recovery efforts for the bald eagle population in and around the park are well underway. A working group was formed in 1981 to help coordinate recovery efforts in the ecosystem, and a recovery plan was prepared. In 1983 the agencies prepared and signed a *Bald Eagle Management Plan* for the greater Yellowstone ecosystem, which augments the recovery plan. The overall management objective for the greater Yellowstone ecosystem bald eagle population is to achieve and maintain 62 breeding pairs with a territorial occupancy rate of 85% annually. Each occupied territory should produce one young per year for a running five-year average of 53 young per year. As of 1989, a mean of 63.5 breeding pairs with a territorial occupancy rate of 88% was tallied, producing an average of 1.05 young per occupied territory. Currently, 14 breeding pairs of bald eagles are nesting in the park. Eagles may continue to forage in and around the edges of Yellowstone Lake. The U.S. Fish and Wildlife Service is reviewing the status of the bald eagle in response to a proposal to downlist the species to threatened status. Data indicate that bald eagle populations have met recovery goals for four of five regions, including the Pacific region, which includes the greater Yellowstone ecosystem.

Impacts

Neither the proposed action nor any of the alternatives considered would have any effect on the recovery of the whooping crane or peregrine falcon populations in the ecosystem. It is likely that human activity does displace some bald eagles away from the lakeshore; however, feeding, roosting, and nesting sites are abundant along the shoreline of Yellowstone Lake. Bald eagle nesting sites are secure and would not be affected by this proposal or the alternatives. The population's production and survivorship are increasing, and the bald eagle throughout the region is being considered for downlisting to threatened status. In combination with existing management, which protects bald eagle nest sites (none of which are in the

developed areas), the proposed action is not likely to affect the recovery of the bald eagle population in the ecosystem.

THREATENED SPECIES — GRIZZLY BEARS

Description

Introduction. The only animal species present and listed as threatened in the park is the grizzly bear (*Ursus arctos horribilis*). The grizzly bear was classified in 1975 as threatened in the contiguous United States. Fewer than 1,000 grizzlies are thought to survive in six areas of Montana, Wyoming, Idaho, and Washington. The greater Yellowstone grizzly bear population is the second largest of the recovery populations and is estimated to have a minimum of 200 bears. The grizzly ranges over 5.5 million acres within the greater Yellowstone ecosystem, with nearly 40% of this range (2.2 million acres) within Yellowstone National Park. In Yellowstone the recovery and management of the grizzly bear is of the highest priority and is mandated by the Endangered Species Act.

Methods of Population Research and Monitoring. In 1973 the Interagency Grizzly Bear Study Team (IGBST) was established to continue research on grizzly bears and their habitat in the greater Yellowstone ecosystem. Objectives of IGBST studies are to determine the status and trend in the grizzly bear population, the use of habitats and food items by bears, and the effects of land management activities on the grizzly bear population (IGBST 1991). Study methods are reported by Blanchard (1985) and Mattson et al. (in press); the study area has been described in detail by Blanchard and Knight (in press) and Knight and Eberhardt (1985).

In 1983 an interagency committee was formed to ensure that the ecosystem was managed in ways that would help the grizzly bear population recover. The Interagency Grizzly Bear Committee (IGBC) includes representatives of the U.S. Fish and Wildlife Service, the Forest Service, the Bureau of Land Management, the National Park Service, and the fish and game departments of Idaho, Montana, Wyoming, and Washington. The *Grizzly Bear Recovery Plan* is the basic management document guiding the recovery effort (USFWS 1982); a revised recovery plan is now being reviewed (USFWS 1990a). Yellowstone's bear management program is directed toward preserving and maintaining the grizzly bear population as part of the park's native fauna, while providing for visitor safety.

In 1984 the IGBC Yellowstone Ecosystem Management Subcommittee adopted an objective of developing a methodology to quantitatively and qualitatively assess the cumulative effects of human activity on the grizzly bear and its habitat in the Yellowstone ecosystem. Subsequently, the Forest Service and the National Park Service jointly developed a computerized mathematical model called the cumulative effects model (CEM). The model recognizes two key factors influencing the potential recovery of the grizzly bear population in the greater Yellowstone ecosystem. These factors are the effectiveness of the habitat available to grizzly bears and grizzly bear mortalities.

The model was first applied in the 1987 *Draft Environmental Impact Statement / Development Concept Plan* for Fishing Bridge. However, since then the IGBC subcommittee and the CEM modeling team have recognized that in order to make the model more usable, technological advances in computer application and database updates to take into account the effects of the

1988 fires must be incorporated in the model. Updated scientific information, such as that related to bear use of spawning streams, also must be incorporated into the cumulative effects analysis. At this time the cumulative effects model is not available to assess the relative merits of the alternatives in this plan (Richardson, pers. comm.). However, the rationale behind the cumulative effects model lends itself to making a qualitative biological assessment of the impacts related to the proposed action and alternatives for Lake and Bridge Bay.

In order to monitor the bear population trends, and to meaningfully analyze the effects of use or development on locally affected bears, occupied grizzly bear habitat in the Yellowstone ecosystem has been divided into 18 grizzly bear habitat units (see the Interagency Grizzly Bear Management Units map). These habitat units were delineated based on the principle that each unit should contain a complete spring, summer, and fall habitat for grizzly bears. For most of the units there is substantial evidence that the habitat contains adequate food sources to support grizzly bears in all three seasons.

Since 1959 intensive research has provided scientists and managers with a detailed portrait of grizzly bear life in Yellowstone (Craighead and Craighead 1971; Craighead, Craighead and Sumner 1976; Craighead, Sumner, and Scaggs 1982; Knight, Mattson, and Blanchard 1984; Knight and Eberhardt 1985; Blanchard 1986). Bear habitat and food use since the closing of major garbage dumps in Yellowstone in 1971 have been studied by the IGBST and others (Forest Service, Basile 1982; Blanchard 1983; Graham 1978; Gunther and Renkin 1990; Harting 1985; Judd and Knight 1980; Kendall 1983; Knight, Mattson, and Blanchard 1984; Mattson and Despain 1985; Mattson, Knight, and Blanchard 1986; Mealey 1980; Schleyer 1983; Youmans 1979). This research has revealed numerous food preferences and activity patterns exhibited by grizzly bears in the Yellowstone ecosystem.

Grizzly bear food uses and preferences were determined by fecal analyses conducted between 1977 and 1983. During that period 2,791 scats were collected while sampling habitat in areas where radio-instrumented bears were aerially located. This included 118 bears at 624 locations. Scat collection occurred throughout the bears' active seasons (March through November), even though less effort was possible very early and very late in each year. Both feedsites and scats were carefully analyzed, and a series of indices were developed by which diet items were then ranked in nutritional importance to bears.

The quality of food and the availability of cover are important in assessing the effectiveness of habitat for grizzly bears. Another important component is the effect of disturbance associated with human activities on grizzly bears' ability to use a specific habitat. Average habitat quality for grizzly bears can be compared for different areas. "Pristine" is a hypothetical condition in which no human developments or activities are present. Areas where vegetation has been altered by humans (for example, where trees have been cut or exotic plants have been introduced) are not truly pristine and therefore have reduced habitat effectiveness for grizzly bears. Three fundamental factors in evaluating habitat effectiveness are the vegetation available in each season; protein sources (such as carrion in the spring or spawning fish); and the amount, type, and timing of human use in the area.

Human activity may affect grizzly bears by displacing them from an area or a food source that might otherwise be used in the absence of human activity. The degree of displacement depends on the type, timing, and intensity of human activity. The zone of influence of a particular human activity or development can also be affected by natural barriers for bears

INTERAGENCY GRIZZLY BEAR MANAGEMENT UNITS

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(such as heavy forest cover, hills, or ridges). The zone of influence around any existing park use or developed area is not a real line that affects bears in a uniform manner; rather the line fluctuates based on the season, the time and amount of human use, the quality and availability of bear foods at a specific time, and the nature of the bear(s) using the area. Data suggest that the park's major developed areas effectively displace bears from using those areas to the degree that would be expected if human activity was not present (Mattson and Henry 1987.)

Population Status and Relationship to Recovery Goals. Instead of attempting to conduct a census of the entire bear population, scientists monitor reproduction and mortality to assess population trends. Females with cubs appear to be the most accurately countable segment of the grizzly population. Based on extensive research and monitoring of Yellowstone area grizzlies, the *Grizzly Bear Recovery Plan* (revised draft) proposes setting population goals as follows:

1. 15 females with cubs-of-the-year annually over a running six-year average

2. 15 of 18 bear management units occupied by sows with young, from a running three-year sum of observations, with no two of the unoccupied bear management units adjacent to each other

3. known mortality does not exceed seven total or two adult females annually, averaged over six years

Since the breeding interval is at least three years, the sum of three successive years is considered to represent a minimal population of fully adult females (usually considered to be age six and older), and a running sum of these data provides a population index (Knight and Eberhardt 1985.)

The main need for restoring, or at least maintaining, the Yellowstone grizzly population is to ensure high survival rates of adult females (Knight and Eberhardt 1985). The margin between population decline and stability is not likely to be much more than one or two breeding-age female bears per year in total mortality (Knight and Eberhardt 1984). Since observed mortality must be assumed to be less than total mortality, minimizing adult female mortality is of primary importance.

If the greater Yellowstone area maintains sufficient habitat available to support a viable population of grizzlies, and if bear mortalities are minimized, especially those of breeding females, it should be possible to protect this threatened population and to aid its recovery. The *Grizzly Bear Recovery Plan* outlines actions necessary to accomplish this, and the stated population goals are a means by which to monitor progress toward the recovery of the grizzly bear population.

As shown in table 2, sightings of sows with cubs-of-the-year have increased in the latter half of the 1980s. This may be indicative of a population trend, or it may simply be a result of improved survey methods or sightability. As of 1990, the six-year average of known human-caused mortality was 5.67 bears per year, with an average of 1.67 adult females per year. As indicated in table 2, known adult female mortality averaged at or below target levels from 1983 through 1989, although 1990 was a poor year in this respect.

TABLE 2: FEMALE GRIZZLY BEARS WITH CUBS OF THE YEAR, 1973–1990

YEAR	FEMALES	CUBS	ADULT FEMALE DEATHS (ALL CAUSES, KNOWN AND PROBABLE)
1973	14	26	4
1974	15	26	4
1975	4	6	1
1976	16	30	1
1977	13	25	6
1978	9	18	1
1979	13	29	2
1980	12	23	1
1981	13	24	5
1982	11	20	4
1983	13	22	2
1984	17	30	2
1985	9	16	2
1986	25	48	2
1987	13	29	2
1988	19	40	2
1989	16	30	0
1990	24	57	4
1991	24	43	1

Source: Interagency Grizzly Bear Study Team 1990.

Grizzly Bear Use of the Lake/Bridge Bay Area. The Lake and Bridge Bay developed areas are in the Firehole/Hayden bear management unit, as mapped by the IGBST. As previously described, bear management units (BMUs) are based on the principle that each unit should contain a complete spring, summer, and fall habitat for grizzly bears. In the Fishing Bridge *Environmental Impact Statement / Development Concept Plan,* the Firehole/Hayden BMU was divided into two subunits. The subunit that contains Lake/Bridge Bay was described as having low-quality spring and summer grizzly bear habitat and moderate-quality fall bear habitat. These descriptions were based on the vegetation mapping of the ecosystem, relative to other BMUs. However, the vegetation component of grizzly bear habitat mapping must be viewed in context with other factors, such as the presence of a high-quality protein source in trout-spawning streams.

The vegetation mosaic of this area is comprised of forested sites — lodgepole pine in the drier areas and Engelmann spruce/subalpine fir in the moist sites — interspersed with wet meadows and sedge marshes. This mosaic provides optimal cover for bedding and security as well as the added availability of alternative food sources among the different vegetation types.

Bears forage on roots, bulbs, and foliage of many meadow and marsh plants, and they prey on pocket gophers and invertebrates in open meadows. During late May, June, and sometimes into mid-August, grizzly bears fish for spawning cutthroat trout in tributary streams of Yellowstone Lake. Studies conducted from 1985 to 1987 (Reinhart 1990) and surveys continuing in 1989 (USFWS 1990b) and 1990 (USFWS 1991) indicate that trout spawn in at least 10 of the 15 streams that flow into Yellowstone Lake from Fishing Bridge south to Sand Point: 1204, 1203 (Lodge Creek), 1202 (Hotel Creek), 1201 (Hatchery Creek), 1200, 1199

(North Incinerator Creek), 1198 (Wells or South Incinerator Creek), 1197 (Bridge Creek), 1192 (Weasel Creek), and 1191 (Sand Point Creek). Several of these streams are partially blocked by culverts or other man-made impediments; however, they still show evidence of bear activity during the spawning season. All 10 of these streams have had demonstrated bear-fishing activity during some or all of the past five years.

In recent years increased use of spawning cutthroat trout as a spring food source for the grizzly bear has been documented (Reinhart 1990). Between 1985 and 1987, 93% of Yellowstone Lake's spawning tributaries had associated bear activity, and 61% had conclusive evidence of bear fishing. Research on grizzly bears' use of trout suggests that bears will continue to increase their spring use of spawning areas in and around Yellowstone Lake. This is probably due to a combination of factors: more conservative human fish harvests and a recovering fish population, a bear population weaned away from garbage dumps, and a possibly expanding grizzly bear population.

To help manage bear/human conflicts and to better understand the value of spawning trout to grizzlies, the National Park Service initiated weekly surveys of spawning fish and bear use in the Lake/Bridge Bay and Grant Village developed areas in 1989. That year the spawn in the Lake/Bridge Bay area streams began the week of May 14 and ended by June 29. The stream with the largest number of spawners was Bridge Creek, followed by Lodge Creek and Wells Creek. Spawning activity lasted for seven weeks in each of these streams. Grizzly bear tracks and evidence of bear predation on trout were observed in these three streams and one other stream in the area. Track measurements revealed a minimum of three or four grizzly bears searched spawning streams in 1989; this included a sow with two cubs-of-the-year. In 1990 the spawn began May 8 and was last observed on July 3. The largest spawning runs were in Bridge Creek, Wells Creek, Lodge Creek, and North Incinerator Creek. Grizzly bear tracks were again observed along each of these creeks, as well as in other surveyed areas. Track measurements in 1990 indicated that six or seven grizzly bears and one unidentified bear used the streams during spawning season. Two of the identified bears were with young, one with a cub-of-the-year, and one with a yearling (USFWS 1991). In 1991 the spawn began May 28 and was last observed July 5. The largest spawning runs were in Wells Creek, followed by Bridge Creek and Lodge Creek. Grizzly bear tracks were observed along each of these creeks, as well as in other surveyed areas. Track measurements in 1991 indicated that nine grizzly bears and two unidentified bears used the streams during spawning season. One of the grizzly bears was with a two-year-old cub (Andrascik, pers. comm.).

Annual variation in timing of the spawning run is influenced by spring runoff and water temperatures. Bear predation on spawning trout appears strongly related to fish density. Reinhart and Mattson (1990) indicated that bear activity began at the peak of the spawning run, was highest after peak spawning, and declined thereafter. Track surveys are a conservative estimate of the minimum number of bears using spawning streams. It is likely that not all bears using spawning streams were tallied because tracking substrate is not always ideal, and bears with similar sized tracks cannot be distinguished. Bears are also most active at night, and are generally not observed during daylight hours when most park visitors are active. However, in each of the years since 1986 at least one grizzly bear has been regularly active during the day in the developed area. Between 1986 and 1990 this was a young sow, in 1990 and 1991 it was her male cub, and in 1991 a second male grizzly bear used the streams during the day.

Impacts at Lake/Bridge Bay

Mortality is an obvious direct effect on individual grizzly bears and, because of the threatened nature of the population, possibly on the population as a whole. The effects of human activity on occupied grizzly bear habitat can be both direct and indirect. Construction activity on previously undisturbed ground directly removes such acreage from habitat available to grizzly bears by removing the vegetative cover. Human activities may also directly affect bears by displacing them away from habitat that they might otherwise have used, or by causing some bears to change their behavioral patterns. For example, when human foods or other bear attractants are available, bears may be attracted to an area despite the absence of good natural foods. Construction or additional human activity in a previously undisturbed or even in an already disturbed area may also have indirect effects on bears by displacing potential prey species, such as ungulates or spawning fish, or by changing the distribution of bears.

Proposed Action. The actions called for in the approved *Final Environmental Impact Statement / Development Concept Plan* for Fishing Bridge are primarily the proposed actions in this development concept plan for Lake/Bridge Bay. The impact analysis focuses on the proposed action's direct effects on grizzly bear displacement and mortality, and on direct and indirect effects on habitat effectiveness.

Direct effects —

Displacement: Research on bear use of cutthroat spawning streams in Yellowstone (Reinhart and Mattson 1990) has shown that when bears use streams near human developments (hotels, stores, campgrounds), they are influenced by the presence of humans. Bear use of spawning streams less than 1 kilometer (km) from park developments is less than expected, despite high densities of spawners. Effects are greatest when spawning runs coincide with human use and occupancy of the facilities. Even though survey results suggest that much of the bear fishing occurs at night by bears that are seldom seen by park staff or visitors, bear fishing has also been observed during daylight hours (French and French in press). It is hypothesized that less dominant bears take advantage of this feeding opportunity when more dominant bears prefer to bed down or stay under cover.

The presence of grizzly bears in the Lake/Bridge Bay area indicates that the development does not completely displace bears from the area. Although the presence of humans and human activity might cause some bears to avoid the area, the attraction provided by spawning fish and by potential human foods and garbage may outweigh the deterrent effect of human activity for other bears. It is possible that certain bears may also make use of the Lake/Bridge Bay area despite human use because of the absence of other, more dominant bears.

Bears using the Lake and Bridge Bay habitats will continue to come into conflict with humans. The trout-spawning streams and the composition of the vegetation in and around the Lake developed area will continue to present a high-quality spring and summer food source that will attract grizzly bears. The shoreline of Yellowstone Lake provides a natural travel corridor for bears moving around the lake searching for food. Bears following this travel corridor along the west shore of the lake are likely to enter the Lake and Bridge Bay developed areas. The spawning season coincides with the

opening of visitor facilities along the lakeshore, beginning in mid- to late-May. Watching spawning fish has become an increasingly popular visitor activity, and many visitors are drawn to the area by the added attraction of bears. As with any area within grizzly bear habitat where humans and grizzlies have major attractants, the potential for conflicts occurs. This potential for conflict translates into potential bear handlings, transfers, and mortalities.

Bear mortality: Since hunting is not permitted in Yellowstone National Park, nearly all human-caused bear mortality within park boundaries is the result of management actions taken against habituated or nuisance grizzly bears. Road kills occasionally also contribute to grizzly bear mortalities.

Developed areas in and around the park have historically been population sinks (that is, sources of high mortality) for grizzly bears in the ecosystem (Craighead et al. 1988). In such areas of human use and occupation a bear can become attracted to human foods (such as garbage or camp cooking), become used to being near humans and continue to seek out a readily available food source, or lose its natural fear of humans. These bears then pose a threat to humans or property. Adult females, females with young, and subadult males have been observed foraging nearest to humans, especially when rich native foods are at stake, and consequently they become habituated (Mattson 1990).

Bears that persist in frequenting areas of human occupation pose a greater risk of injury to humans (Herrero 1985) and to themselves. Such bears are eventually trapped and translocated in order to remove the threat to human safety as well as to increase the odds of the bear's survival; however, the long-term success of bear translocations is questionable (Meagher and Fowler 1987). Experiments to date in conditioning bears to avoid roadsides and developed areas have been inconsistent in changing bears' long-term behavior patterns (Hammond et al. 1989). If repeated experiments or translocations do not succeed in keeping an individual bear from presenting a high potential for bear/human conflict, the bear may be removed from the ecosystem. If a bear develops a history of conflicts or becomes a potentially unacceptable hazard to humans, it must be removed. A bear that is removed from the park, even to another ecosystem or to a zoo, is considered a "mortality" in the ecosystem.

This sequence of events has occurred in every developed area inside and outside the park. Despite an intensive garbage management and sanitation program that has been in effect in Yellowstone for two decades, there are still occasions when bears become attracted to human or natural foods in and near developed areas and become habituated to human presence. The number of bears that have been trapped and translocated according to interagency grizzly bear management guidelines (IGBC 1986) has declined substantially since the early 1970s (see table 3). However, the goal is to keep management handlings and removals to a minimum.

Because a bear may become a nuisance bear (as defined by IGBC guidelines) as a result of incidents at several locations before it is removed from the ecosystem, its removal cannot be attributed only to the location from which it was ultimately removed. When a bear is first trapped, it is marked and usually relocated to a remote area. Therefore, it is more appropriate and more conservative to use the number of transfers,

TABLE 3: GRIZZLY BEAR TRAPPINGS/TRANSLOCATIONS IN YELLOWSTONE NATIONAL PARK 1970–1990

SUBDISTRICT	1970–75 No.	%	1976–80 No.	%	1981–85 No.	%	1986–90 No.	%
Mammoth	1	1	0	0	0	0	4[a]	13
Tower	4	3	0	0	0	0	6	19
Lamar/Northeast	0	0	0	0	0	0	0	0
Norris	1	1	2	7	0	0	0	0
Canyon	33	25	3	11	2	8	6	19
Lake[b]	53	40	14	52	15	63	10	32
East	0	0	0	0	0	0	3	10
Grant	11	8	0	0	4[c]	17	1	3
Snake	0	0	0	0	0	0	0	0
Madison	4	3	0	0	0	0	1	3
Old Faithful	24	18	7	26	2	8	0	0
West	3	2	1	4	1	4	0	0
Total	**134**		**27**		**24**		**31**	

Source: Yellowstone National Park, Bear Management Office, 1990.

a. Female and three cubs-of-the-year were trapped together.
b. Including the Lake, Bridge Bay, and Fishing Bridge developed areas.
c. Including a female and two cubs-of-the-year trapped together.

rather than the number of removals, from an area as a measure of the degree that a given development contributes to bear mortality. A similar technique was used in an independent investigation by Povilitis (1987) to generate mortality risk indices for the entire Yellowstone ecosystem. Yellowstone keeps records on bear transfers and removals in the park by subdistrict, and an individual bear's history will include documentation of known incidents in and around specific developed areas (see table 4).

If a grizzly bear must be trapped for management reasons, the opportunity to do so is taken wherever human safety and expediency permit. Thus, just because a bear is trapped at Bridge Bay does not mean that the reason for its being trapped is connected only with Bridge Bay. The potential for bear management actions, such as attempted aversive conditioning, trapping and translocating, or removal, remains high in the Lake area. As shown in tables 3 and 4, the Lake area is the site of a high percentage of management trappings/translocations and grizzly bear removals. In the most recent 10-year period (1981–1990) 25 bear trapping/translocation efforts were carried out in the Lake subdistrict (which includes the Fishing Bridge, Lake, and Bridge Bay developed areas). During the same period six grizzly bears (four males and two females) were removed. However, it cannot be assumed from this data that the number of adult females involved in future management removals would average 33% of the total.

The number of grizzly bears trapped and translocated has remained fairly constant since 1976 (see table 3), as has the number of grizzlies removed from the park since 1976 (see table 4). Thus, it is reasonable to conclude that present management actions would remain fairly constant over the next decade, at an average of about one grizzly (either sex) being removed from the park every year. Based on past experience, approximately 50% of these bears are likely to come from the Lake subdistrict. These bear mortalities, usually related to park developed areas, in addition to unpredictable

TABLE 4: GRIZZLY BEAR MANAGEMENT REMOVALS IN YELLOWSTONE NATIONAL PARK 1970–1990

SUBDISTRICT	1970–75 No.	%	1976–80 No.	%	1981–85 No.	%	1986–90 No.	%
Mammoth	0	0	0	0	1	17	0	0
Tower	3	8	0	0	0	0	0	0
Lamar/Northeast	0	0	0	0	0	0	0	0
Norris	0	0	0	0	0	0	0	0
Canyon	7	19	0	0	1	17	1	25
Lake[a]	12	32	2	40	3	50	3	75
East	0	0	0	0	0	0	0	0
Grant	10	27	0	0	0	0	0	0
Snake	0	0	1	20	0	0	0	0
Madison	1	3	0	0	1	17	0	0
Old Faithful	4	11	2	40	0	0	0	0
West	0	0	0	0	0	0	0	0
Total	37		5		6		4	

Source: Yellowstone National Park, Bear Management Office, 1990.

a. Including the Lake, Bridge Bay, and Fishing Bridge developed areas.

mortalities outside park boundaries, could slow the rate of grizzly population recovery; this is not likely to change, however, as a result of the proposed actions.

Habitat effectiveness: In 1985 the habitat effectiveness of the subunit of the Firehole/Hayden bear management unit, which includes Lake and Bridge Bay, was mapped for the cumulative effects assessment for the Fishing Bridge *Environmental Impact Statement / Development Concept Plan*. At this time habitat effectiveness was estimated to have already been reduced by an average of 18.4% due to existing human activities in the subunit, including the developments at Lake and Bridge Bay. The proposed developments in the Lake area would increase the total amount of disturbed ground by 14.0 acres. Considerable effort has been made to locate new construction related to this plan on previously disturbed ground, and to keep such construction within the existing zone of influence of the Lake/Bridge Bay developed areas. These acres are already below their "pristine" habitat quality value because of the effects of displacement and disturbance caused by existing human activity. The result is that the effect on bear displacement would not be as great as if the limits of the developed area were expanded outward.

A major purpose of the proposed action is to continue the removal of facilities and human activities from the Fishing Bridge area. This action will continue the restoration of grizzly bear habitat.

Indirect Effects — Indirect effects of the proposed action are more difficult to predict than direct effects. The existing conditions and the proposed action place high priority on minimizing conflicts between bears and humans, and between humans and other resources. Spawning fish are protected from human use throughout the spawning season, so humans do not compete with bears for this spring/summer prey. The Lake/Bridge Bay area is not an elk-

calving area, and no other major food items for bears should be indirectly affected by the proposed action.

Human activity and its associated risk of displacement and potential mortality of grizzly bears may cause changes in the behaviors and relationships of bears that use the Lake/Bridge Bay area. These effects are likely to be complex and not easily observed. The presence of human activity combined with a high-protein spring/summer food source may actually attract subdominant bears that would be displaced by larger or more well-established bears in a backcountry area. Also, the long-term goal of the proposed action is to remove additional human use and facilities from grizzly bear habitat in the Fishing Bridge area, which should directly and indirectly benefit the bear population.

Measures to Reduce Impacts to Grizzly Bears — In an effort to reduce and manage potential conflicts between bears and humans in the Lake/Bridge Bay area, particularly during the spawning season, park staff proposed a series of management actions beginning in 1988. Several actions were implemented, and others are appropriate to consider during the implementation of this development concept plan. Those already implemented include (1) increased monitoring of bear activity and trout spawning levels; (2) opening the Fishing Bridge visitor center by Memorial Day weekend in order to improve visitor contacts and education, especially relating to bears; (3) closing all spawning streams to human access or use during the spawning season (spawning streams are closed to fishing until July 15); (4) temporarily restricting human access or use of portions of the Lake/Bridge Bay developed areas frequented by bears; (5) phasing in campground and lodging unit loops to reduce potential bear/human encounters near spawning streams and known bear travel corridors; and (6) increased staff and public education with special programs and a newly designed brochure and map addressing bear/human conflicts in the area. All existing measures that may be helping to reduce the number of grizzly bears being trapped, translocated, and removed from the ecosystem will be continued.

NPS and concessions managers would adjust facility opening dates, based on current and evolving resource data and visitor needs. The visitor lodging units closest to Lodge Creek would be relocated and consolidated in areas away from spawning streams within the next 10 years. All food and trash storage facilities would be designed with the best available "bear resistant" technology. Visitor and staff travel routes, particularly walking paths, would be located away from known bear travel corridors.

The management of conflicts between bears and humans has the highest priority in Yellowstone National Park. The National Park Service desires to keep the number of bear translocations and removals to an absolute minimum, recognizing that it is not likely that these events will ever be reduced to zero. Additional measures would be taken as necessary to improve safety for both humans and grizzly bears in the Lake/Bridge Bay area without unduly restricting each others' movements.

The proposed action calls for phasing out use of the Natural Bridge road and replacing it with a hiking/biking trail once the gravel pit and boat trailer storage area (approximately 9.5 acres) have been restored to natural conditions. This corridor of human activity lies within the same grizzly bear habitat unit as the Lake/Bridge Bay development. This action would provide both restored habitat effectiveness and reduced human displacement just south of the Bridge Bay developed area.

In addition, the restoration of other existing disturbed areas is proposed in order to reduce or eliminate the adverse impacts due to the loss of habitat effectiveness caused by existing development and the proposed action. Two sites, one in the Little Thumb Creek area and the other in the Otter Creek area, are in bear management units in or adjacent to the Lake/Bridge Bay developed area. The combined acreage at these sites is approximately 15 acres. While smaller than the total disturbed area attributed to the proposed action, this area is larger than the acreage of new disturbance attributed to the proposed action. After these two areas have been restored they would likely have a higher per-acre value to the grizzly bear population than those of the Lake developed area. These areas were formerly used as service areas and are outside the boundaries of any other existing development.

The Otter Creek site, near Hayden Valley, would restore approximately 3.5 acres of habitat in an area of substantial contiguous and undisturbed acreage. The park's main loop road crosses through Hayden Valley, between Otter Creek and Mud Volcano; other than this long-established road corridor, there are no other usable service roads besides the Otter Creek site.

The park also proposes to restore and rehabilitate the Little Thumb Creek quarry and service road, at the southern end of the Firehole/Hayden bear management unit. Historical activity in this administrative area has resulted in erosion, siltation, and dewatering of an otherwise highly productive spawning stream. Water remains in the lower portion of Little Thumb Creek during the cutthroat spawning season, and grizzly bears regularly use the creek each spring. The alteration of the stream channel near the old quarry forces fish and bears to stay near the main park road, as the stream currently lacks water less than 0.25 mile above the roadway. Restoring the stream channel would likely provide fish with suitable spawning habitat farther upstream where bears would find more cover while fishing. A proposal has been made to reclaim the former service area with state mining reclamation funds. When accomplished, this would restore approximately 11.5 acres of grizzly bear habitat along a spawning stream in the bear management unit affected by the Lake developed area.

Conclusion — Based on population monitoring in relation to the ecosystemwide goals, the overall trends in bear production and survivorship appear positive in the short-term. In terms of impacts on grizzly bears the proposed action may affect the grizzly bear population. This is because the Lake developed area would continue to account for a relatively high proportion of potential bear mortalities or removals from the ecosystem, including adult female mortalities. Current management actions designed to reduce this potential would be maintained, and additional actions to reduce or eliminate adverse impacts would be taken. Even though these management actions would not reduce the effects of the proposed action to zero, the combined effect of the existing conditions and proposed action is not likely to adversely affect the existence of the grizzly bear population in the ecosystem.

Alternative A (No Action). As described above, the existing conditions in the Lake/Bridge Bay developed areas both attract grizzly bears and displace them from using the habitat as completely as they would if the area was undeveloped. Data show that even though the total number of adult grizzly bears removed from Yellowstone due to the unacceptable risk to humans has declined considerably since the 1960s and early 1970s, a high percentage of nuisance bears in Yellowstone National Park in the near future are likely to come from the Lake developed area. In the 1980s two of the six grizzlies removed from the Lake subdistrict were adult females. Subadult males and adult female grizzlies are more likely to forage closer to humans and become habituated; therefore, these sex and age groups are more likely to be

involved in management actions. The number of grizzly bears trapped and translocated has remained fairly constant in each five-year period since 1976 (see table 3). Similarly, the number of grizzlies removed from Yellowstone National Park has remained at constant levels in the five-year periods since 1976 (see table 4). It is reasonable to assume that under the no-action alternative these levels of management actions would remain fairly constant over the next decade, at an average of one grizzly (either sex) being removed every other year from the Lake subdistrict. Thus, the no-action alternative may affect the grizzly population.

As described under the proposed action, management actions have been taken, and additional measures have been proposed to reduce potential bear/human conflicts, and thus potential bear mortalities.

Alternative B (Lake Only). Effects of this alternative in the Lake and Bridge Bay developed areas would be very similar to those described under the proposed action; however, the total acreage disturbed would differ. The major difference is that this alternative would retain and upgrade the existing service station/auto repair facility at Fishing Bridge, which would necessitate an amendment to the Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan*. Since the actions outlined in that plan required the issuance of a biological opinion from the U.S. Fish and Wildlife Service, retaining and upgrading the service station/auto repair facility would affect the grizzly bear population and would require a new biological opinion.

Even though some facilities are proposed for retention in the Fishing Bridge area, the campground has been closed, all employee housing would be relocated, and restoration of the area would continue. Retaining the service station/auto repair facility would reduce the habitat identified for restoration over the long term. It is not likely that retaining the facility would contribute to increased bear mortality risk, but in combination with the other remaining human activities, the risk of bear/human encounters would not be reduced. Upgrading the facility would decrease the likelihood that this area would ever be completely restored to full habitat effectiveness.

CATEGORY 2 SPECIES

Description

Several plant and animal species are currently listed by the U.S. Fish and Wildlife Service as potential candidate species for listing as endangered or threatened. These species are called category 2 species, and although there is some evidence of vulnerability, the data are insufficient to support listing proposals at this time. The following category 2 species are known to be present in Yellowstone:

The lynx (*Felis lynx*) and the wolverine (*Gulo luscus*) are mid-sized carnivores that are generally believed to range in Yellowstone National Park. The lynx's resident breeding status in the park is uncertain, but sightings have been reported over the course of the park's history. It is generally impossible to verify the reliability of sightings, particularly since the similarly looking bobcat (*Felis rufus*) is present. Slightly more evidence suggests that there is a breeding population of wolverine in the greater Yellowstone

ecosystem, but abundance and distribution are undocumented. Both lynx and wolverine are wide-ranging, generally solitary in nature, and prey or scavenge on other mammals.

The spotted bat (*Euderma maculatum*) has not been documented in Yellowstone, but could exist here. The western big-eared bat (*Plecotus townsendii*) has been collected in the Mammoth area and is probably widely distributed in the park, even though it has not been studied here. It generally lives in caves, which do not occur in the Lake/Bridge Bay area. The only recorded specimen of Preble's shrew (*Sorex preblei*) in the greater Yellowstone ecosystem was collected at Lamar ranger station; again, no information exists on its distribution or abundance in the park.

The Arctic grayling (*Thymallus arcticus*) exists in several lakes in Yellowstone. A fluvial form that lived entirely in riverine habitats occurred historically in the Madison River drainage and below the barrier falls in the Firehole and Gibbon rivers. The fluvial species is now very rare in the upper Missouri River basin and may no longer occur in Yellowstone. A plan to reintroduce this species in several park streams is being considered; none of the candidate streams are within the Lake/Bridge Bay area.

Category 2 bird species include the ferruginous hawk (*Buteo regalis*), the mountain plover (*Charadrius montanus*), the long-billed curlew (*Numenius americanus*), and the burrowing owl (*Athene cunicularia*) — all of which are rarely or accidentally recorded in the park.

Ross's bentgrass (*Agrostis rossiae*) is a category 2 plant species that is endemic to Yellowstone National Park. This species is found in the park's unique habitat surrounding thermal areas. In the early 1980s the U.S. Fish and Wildlife Service proposed listing *Agrostis rossiae* as an endangered species. This led to the location of additional populations in the park. A memorandum of understanding between the U.S. Fish and Wildlife Service and the National Park Service specifies that the park continue actively monitoring and protecting this species in lieu of federal listing. The Lake and Bridge Bay developed areas do not contain habitat for or populations of Ross's bentgrass.

Impacts

The small-scale, site-specific actions under the proposed development concept plan or the alternatives should not affect the population status of the lynx, wolverine, ferruginous hawk, mountain plover, long-billed curlew, or burrowing owl. No habitats for the spotted bat, western big-eared bat, Preble's shrew, Arctic grayling, or Ross's bentgrass occur in the Lake/Bridge Bay area, and these species would not be affected by the proposed action or the alternatives.

CUMULATIVE EFFECTS ANALYSIS

As explained in the "Purpose of and Need for the Plan" section, facilities in the Lake and Bridge Bay areas need to be upgraded and access improved so that the areas functionally serve the needs of park visitors. In addition, this plan is necessary to accomplish actions outlined in the 1988 *Final Environmental Impact Statement / Development Concept Plan* for

Fishing Bridge. A primary purpose of that plan was to contribute to the overall grizzly bear recovery effort in the greater Yellowstone ecosystem, an objective that remains integral to this document.

An Aggregation of National Park and National Forest Management Plans (Greater Yellowstone Coordinating Committee 1987) for the greater Yellowstone area presents the current situation with respect to ecological, economic, and social conditions. The document incorporates information from the plans of the six national forests, two national parks, and other federal, state, and private agencies and individuals where available. The status of management activities such as timber, minerals, range, transportation, and recreation are shown for the next 10 to 15 years. The existing and proposed conditions in the greater Yellowstone ecosystem follow.

Roads

Except for new recreational access roads into the Custer and Gallatin national forests, new roads built in forests during the next decade will mainly support timber harvests. Most new local roads and some collector roads will be open only to provide access to areas for management activities, including habitat improvement projects, fire fighting, and resource monitoring. No new roads are planned for national parks in the area.

Road management goals for the greater Yellowstone area include closing roads seasonally to protect them from vehicle damage during wet weather; closing unneeded roads throughout the year; closing roads to protect wildlife from disturbances; and opening roads for timber harvests, mining, recreation, and other uses only when impacts on wildlife and vegetation are acceptable.

Recreation

Recreation in parks and forests at the 460 developed sites in the area currently totals about 9 million recreation visitor days (one recreation visitor day [RVD] equals 12 hours of use, either continuous or intermittent, by one or more persons). This is projected to increase an average of 3% annually. Yellowstone and Grand Teton national parks have the most use at developed sites and also have the greatest capacity to accommodate this use.

Wilderness proposals will cause parks and forests to slightly decrease the number of acres open to motorized use. Some areas currently open to vehicles may sustain adverse resource effects and may subsequently be closed to motorized use.

Concessions

In national parks no expansion of concession activities is contemplated. About 100 applications for recreational or concession special use permits are received each year by the national forests. Current guidelines (1) encourage private commercial recreational development on private land within and adjacent to national forests, (2) manage recreational special use permits to ensure that 80% of designated capacity is available to the user public, (3) prohibit

the establishment of new recreational residence tracts, (4) manage potential recreational sites and potential ski area sites to ensure availability and desirability, and (5) authorize expansion of existing facilities where a demonstrated need has been established and where there is no conflict with other resources. An environmental analysis will be made for each proposal.

Wilderness

About 53% of the national forest and national park lands in the greater Yellowstone area are wilderness or have been recommended to Congress for wilderness designation. All of the nearly 4 million acres of designated wilderness in the area are within national forests. Major changes to management of these areas is not expected. Current forest management plans specify that 2,072,800 acres will remain undeveloped for at least the next 10 to 15 years. Nearly 8.3 million acres of the greater Yellowstone area are managed as designated wilderness, recommended wilderness, wilderness study areas, or natural areas (undeveloped).

Grazing

In national forests slightly more than half of the land is open to cattle and sheep grazing. Most areas in forests are open to grazing by recreational livestock. Reduction in numbers of livestock grazing and using rest-rotation or deferred-rotation grazing have helped to improve the range. More than 30,000 acres of range in poor condition are projected to improve to fair or better condition during the next 15 years.

Mining

Approximately 60% of the land within the greater Yellowstone area has been withdrawn from mineral leasing, or will be recommended for no leasing in the event applications are received. Another 17% is open, but with no surface occupancy stipulations; 17% is currently leased for oil, gas, or phosphate; and the remaining land is open to leasing with certain stipulations designed to protect other resources, such as wildlife and water quality.

In 1990 Noranda and Crown Butte, Inc., submitted an application to the state of Montana for a permit to mine gold, silver, and copper in an area a few miles northeast of Yellowstone National Park, near Cooke City, Montana. Even though this proposal is in the early stages of application, it could cause long-term changes in traffic patterns; in size, demographics, and economics of the local communities; and in visual, water, air, plant, and wildlife resources in the area. An environmental impact statement will be prepared before a mining permit can be granted by the Montana Department of State Lands.

Timber Harvest

All forests have timber sales of varying size. However, most timber harvesting in the past has been in the Targhee and Gallatin national forests. The majority of future timber harvest is planned for Targhee National Forest. In 1988 wildfires burned an estimated 39,200 acres on national forest lands considered suitable for timber management (about 2.2% of all greater

Yellowstone area lands are of this type). Some salvage harvests of fire-damaged timber occurred, as did some artificial reforestation.

Grizzly Bears

Habitat important for grizzly bears has been uniformly mapped and computerized, and management direction for these areas is being coordinated in accordance with the *Interagency Grizzly Bear Guidelines* (IGBC 1986). Management directions for activities such as timber harvest, road construction, livestock grazing, and mineral leasing are sensitive to other resources, such as soil, water, wildlife, and fish.

Grizzly bear habitat in the greater Yellowstone ecosystem is stratified into different management situations, as described in the *Interagency Grizzly Bear Guidelines*. Habitat components, bear use, and the presence of other uses or activities are the factors that determine the particular management situation for grizzly bear habitat. In recent years much of the management emphasis in grizzly bear habitat has been aimed at reducing grizzly mortality as a result of bear/human conflicts. Programs such as requiring safe camping practices, public and hunter awareness, installation of bear-proof storage and garbage containers, and closure of grizzly bear habitat to bear baiting are some programs that are currently being emphasized.

Direct habitat improvement (vegetative manipulation) has not been undertaken in national forest wilderness areas or in Yellowstone and Grand Teton national parks. However, in these areas visitor use is being managed in ways that positively affect wildlife habitat. Some examples of this include human use restrictions in areas to avoid grizzly bears, bear-proofing of trash cans and an intensive garbage-management program, and careful planning of roads and trails to avoid important habitat areas.

The greater Yellowstone grizzly bear population is the second largest of the recovery populations and is estimated to have a minimum of 200 bears. The *Grizzly Bear Recovery Plan* (revised draft) is the basic management document guiding the recovery effort. Scientists and managers working on modeling the greater Yellowstone ecosystem grizzly bear population recognize two key factors influencing the potential recovery of the grizzly bear population in the Yellowstone ecosystem: (1) the effectiveness of habitat available to grizzly bears, and (2) grizzly bear mortalities. If the greater Yellowstone area maintains sufficient habitat available to support a viable population of grizzlies, and if bear mortalities are minimized, especially those of breeding females, it should be possible to protect and potentially recover this threatened population. The *Grizzly Bear Recovery Plan* outlines actions necessary to accomplish this, and the stated population goals are a means by which to monitor progress toward the two factors.

Based on extensive research and monitoring of Yellowstone area grizzlies, the Interagency Grizzly Bear Study Team monitors the following to assess progress toward recovery goals:

1. 15 females with cubs-of-the-year annually over a running six-year average

2. 15 of 18 bear management units occupied by sows with young, from a running three-year sum of observations, with no two of the unoccupied bear management units adjacent to each other

3. known mortality does not exceed seven total or two adult females annually, averaged over six years

As of 1990, goals 1 and 3 were being met, and 14 of 18 bear management units were occupied (goal 2). Continual monitoring will be done to ensure that these are not short-term trends. There are no plans or proposals in the near future to remove the grizzly bear in the greater Yellowstone ecosystem from protection under the Endangered Species Act, and additional plans need to be prepared before such an action could be considered.

The National Park Service's proposed action for the Lake and Bridge Bay developed areas would not affect grizzly bears outside the park. Because the Lake developed area would continue to account for a relatively high proportion of potential bear mortalities or removals, the implementation of any of the alternatives, including the no-action alternative, would contribute to grizzly bear mortality in the ecosystem, which needs to be continually minimized. However, at present the bear mortality rate in the ecosystem is not exceeding the goal as stated in the *Grizzly Bear Recovery Plan*. The contributions of the proposed action to cumulative effects would be offset by the actions outlined in this plan.

ARCHEOLOGICAL RESOURCES

Description

A Montana State University archeological survey team conducted a reconnaissance inventory along the shores of Yellowstone Lake in 1958 and 1959. As a result of that survey, the team found two archeological sites in the Lake area. Site 48YE379 is along the lakeshore west of the Lake Hotel and directly opposite the hospital and its parking area. Little is known about the site's cultural affiliation or boundaries. Site 48YE380 is nearby, also along the lake shoreline, but east of the Lake Hotel. This site extends back from the lake over several acres and dates to about 3500 B.C. Cultural materials include lithics, ash, charcoal, and fire-cracked rock.

The occurrence of two prehistoric sites along the lakeshore indicates that prehistoric people likely landed their canoes or other vessels at any suitable site around the periphery of the lake. Therefore, their artifacts are more likely to occur along the shoreline, and any projects planned for such locations must recognize the potential for uncovering artifacts.

An NPS archeological survey of the Bridge Bay area conducted during summer 1989 identified a prehistoric campsite (site 48YE48).

Impacts at Lake

Proposed Action. Most proposed construction in the Lake area would occur on ground previously disturbed by construction, which would reduce the chance for affecting intact cultural material. The two known archeological sites would be avoided under this alternative.

If any archeological material was discovered during construction, activity would be halted until the material could be assessed and cleared. Special care would be taken along the lake shoreline, where there is a high probability of encountering prehistoric artifacts.

Alternative A (No Action). Archeological resources would not be adversely affected under the no-action alternative. There would be no new impacts on the two known archeological sites. If any archeological material was discovered during the construction of facilities called for in the Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan*, activity would be halted until assessment and clearance actions were performed.

Alternative B. The two known archeological sites would be avoided under this alternative. Road realignments, facility construction, and parking area relocations would require archeological monitoring for any new ground-disturbing activities. Construction activities would be halted if archeological material was discovered during construction until salvage and clearance actions were performed. Special care would be taken along the lake shoreline, where there is a high probability of encountering prehistoric artifacts.

Impacts on Bridge Bay

Proposed Action. Because no archeological survey was conducted when the Bridge Bay complex was established, some prehistoric artifacts may have been destroyed or disturbed during that period. The prehistoric campsite identified during the 1989 survey is outside the areas of proposed construction. If any archeological artifacts were discovered during construction, activities would be halted so that assessment and clearance actions could be undertaken.

Alternative A (No Action). Under the no-action alternative the potential for adverse effects on archeological resources would be minimized. In the event that unknown archeological resources were uncovered as a result of routine and preventive maintenance operations, then all activity would be halted until assessment and clearance actions were completed.

HISTORIC RESOURCES

Description

The cultural resources in the Lake area reflect several aspects of Yellowstone National Park history: administration of the park, the role of concessioners, and the role of conservation.

The Fish Hatchery Historic District, entered on the National Register of Historic Places on June 25, 1985, is significant for its role in fisheries conservation in Yellowstone National Park and for the rustic architecture. Nine buildings comprise the historic district — the mess hall/south district office (HS 725), fish hatchery (HS 726), residence and office (HS 729), two residences (HS 730 and 731), garage (HS 732), bunkhouse/office (HS 733), laundry/office (HS 735), and oil house (HS 737).

The Lake Hotel was recently listed on the National Register of Historic Places. Few of the other historic structures in the Lake area have been evaluated for eligibility for listing on the National Register of Historic Places. Historic structures will be evaluated for inclusion on the national register prior to any action that has the potential to affect them. Certain structures, including the Lake ranger station, sign cache, fire cache, pump station, and barn, are all associated with the administration of the park. The remaining buildings, including the lodge, cabins, boathouses, store, gas station, and support structures, are associated with the history of concessions in Yellowstone National Park.

A historic resource study for Yellowstone National Park is now being written and will address these resources as they relate to concession history and park administrative history. Cultural landscapes would be considered as part of these studies. The history of concessions is scheduled for completion during 1992. A national register multiple property nomination will follow the completion of each historic study. Until that process has been completed or an interim determination of eligibility for national register significance has been made, all properties 50 years or older are considered potentially eligible for listing on the National Register of Historic Places.

No properties in the Bridge Bay complex are 50 years or older. Therefore, no properties meet the criteria for consideration to the national register.

Impacts at Lake

Proposed Action. Appropriate traditional or adaptive uses would be made of most of the historic buildings in the Lake area, which would ensure their preservation. The adaptive use of any of the properties listed on or eligible for listing on the National Register of Historic Places would be designed to meet the requirements of the NPS *Cultural Resources Management Guideline (NPS-28)* (1985b) and the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (NPS 1983b). The buildings that are potentially eligible for listing on the national register but are scheduled for removal under this alternative are the laundry, the dormitory, the cabins adjacent to Lake Lodge, and the cabins behind the Lake Hotel. If any of these structures was found to be eligible for listing on the national register, the National Park Service would complete the documentation requirements of the Historic American Buildings Survey before the structure was removed.

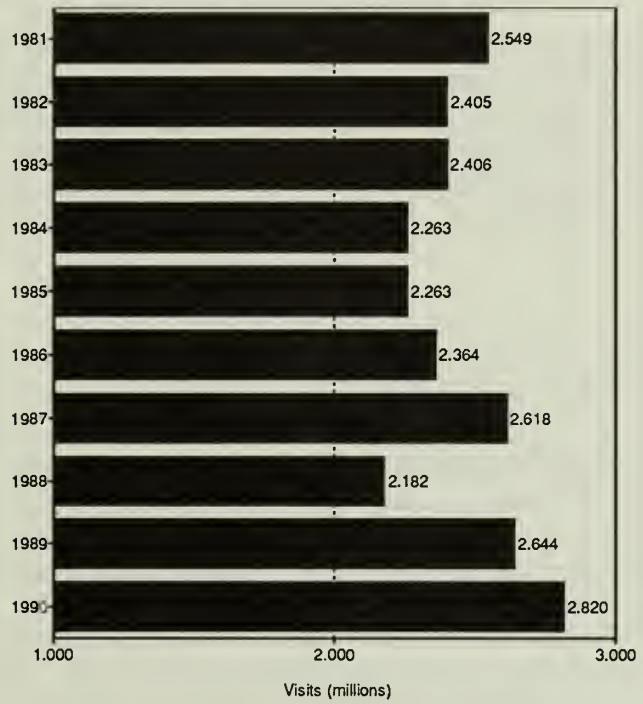
Alternative A (No Action). Current maintenance and planned rehabilitation of existing facilities would continue for all historic and potentially historic buildings. Any planned rehabilitation of properties listed on or eligible for listing on the National Register of Historic Places would be designed to meet the requirements of the NPS *Cultural Resources Management Guideline (NPS-28)* and the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*.

Alternative B. Impacts under alternative B would be similar to those described under the proposed action because adaptive uses of various historic structures in the Lake area would ensure the preservation of most historic buildings except for the two boathouses, which would be removed. If the historic boathouse was found to be eligible for listing on the National Register of Historic Places, then the National Park Service would complete the documentation requirements of the Historic American Buildings Survey before it was removed.

DESCRIPTION

Annual visitation to Yellowstone National Park over the past 10 years has averaged 2.45 million visits. The decline in 1988 was the result of the forest fires that closed much of the park during the peak visitor season. Recreational visits to Yellowstone for the past 10 years are shown in figure 1.

FIGURE 1: RECREATIONAL VISITS TO YELLOWSTONE NATIONAL PARK, 1981–1990



NOTE: Recreational visits exclude residential traffic, through-traffic, and persons traveling on business in the park.

Two-thirds of the park's annual visitation occurs during the peak summer season (mid-June through the end of August). Daily attendance during this season averages around 20,500 people, with attendance on peak days exceeding 23,000 visitors. Many travelers combine their visits to Yellowstone with a trip to Grand Teton National Park, which is just south of the park and is connected to Yellowstone by the John D. Rockefeller, Jr., Memorial Parkway.

Visitor use in the spring accounts for 23.2% of annual visitation, while use in the fall and winter accounts for only 7.3%. Use of Yellowstone during spring and fall (the shoulder seasons) has been increasing as recreationists are learning they can enjoy the park without having to endure the traffic congestion prevalent during summer. Winter use has also been increasing, with over 90,000 visitors in recent years.

Nearly half of all Yellowstone visitors are from the West Coast or Rocky Mountain states. California alone accounts for about 11% of total U.S. visitation. Two recent studies discovered that over half of the recreationists to the park are repeat visitors (University of Idaho 1988; University of Wyoming 1986). A 1989 visitor survey determined that almost half of all Yellowstone visitors stopped in the Lake and Bridge Bay areas (University of Idaho 1990).

Lake and Bridge Bay provide a range of visitor services and activities, generally from the last week of May through mid-September. All services and almost all recreational activities are limited to spring, summer, and fall because the roads are not plowed during the winter. However, the area is accessible by snowmobile, and some snow-based recreational activity does occur (these activities have been addressed in the *Winter Use Plan* [NPS 1990]). The opening and closing dates for lodging facilities, campgrounds, and other visitor services can vary from year-to-year due to unpredictable weather conditions.

The primary visitor activities at Lake and Bridge Bay include viewing and photographing wildlife and Lake Yellowstone, boating, fishing, camping, and some picnicking and hiking. Formal interpretive programs in the area are limited to campfire programs at the Bridge Bay campground and occasional ranger-led walking tours. To participate in evening interpretive activities, lodging guests at Lake can also attend campfire programs at Fishing Bridge. Winter activities include snowmobiling, cross-country skiing, and snowshoeing.

IMPACTS AT LAKE

Proposed Action

Redesigning circulation routes and clearly marking the loop road leading to major facilities and services would improve the visitor experience and reduce the time spent searching for facilities. The proposed circulation changes would effectively separate visitor use and administrative areas, allowing visitors to get to their desired destinations without becoming lost in administrative areas. During construction, visitors would be slightly inconvenienced.

Visitors would continue to enjoy the traditional driving experience along the lakeshore. The construction of a pedestrian trail along the roadway would also allow visitors to walk along the lakeshore. However, the sight and sound of vehicles on this drive could diminish the lakeshore experience for some visitors. The construction of a separated pedestrian trail and vehicular roadway would reduce the potential for conflicts between pedestrians and vehicles, but some conflicts would continue.

Providing interpretive exhibits would greatly enhance the visitor experience through improved educational opportunities and a better understanding of the area's natural and cultural resources. There would also be greater opportunity for interaction with NPS staff. The use of the fish hatchery as an interpretive resource would provide an added dimension to the visitor experience. Improved education programs about grizzly bears would help reduce bear/human conflicts.

Visitors simply needing to use the service station would be able to go directly to the new station without driving through the Lake developed area, thus reducing congestion in Lake. The new repair facility would provide a needed service to visitors, but this location would be

somewhat out of the way for visitors at Sylvan Pass and the RV campground, the sources of many service calls.

Alternative A (No Action)

Conflicts between pedestrians and vehicles would continue along the lakeshore drive. Visitors desiring a quiet reflective time along the lake would continue to be bothered by the sight and sound of vehicles.

Visitors would continue to travel to Bridge Bay or Fishing Bridge for interpretive activities. Those visitors without transportation (primarily tour bus visitors) would have little or no opportunity to participate in interpretive programs.

The relocation of the service station/auto repair facility to a site near the entrance to the Lake developed area, as committed to in the Fishing Bridge *Final Environmental Impact Statement / Development Concept Plan,* would allow visitors to use the facility without driving through the Lake developed area. The location could be somewhat out of the way for visitors at Sylvan Pass and the RV campground, the sources of many service calls.

Alternative B

The circulation changes proposed under alternative B would lead visitors to major facilities and services by way of a main arterial road and would separate visitor use areas from administrative areas, thus helping to decrease visitor confusion in finding facilities and services. As mentioned for the proposed action, visitors would be slightly inconvenienced during construction.

Hotel visitors would be able to enjoy the lake view with minimal intrusion from vehicles. Eliminating vehicles along the lakeshore between the hotel and the ranger station would allow visitors to walk along and enjoy the lake without interference from vehicles.

Providing a new visitor contact facility on the lakefront at the end of the entrance road would greatly enhance the visitor experience.

Retaining a service station/auto repair facility at Fishing Bridge would be more convenient for some visitors.

IMPACTS AT BRIDGE BAY

Proposed Action

Redesigning the campground entrance area would result in less congestion for visitors seeking campsites. Registration waiting time should be reduced by about half with the expanded registration area. Rehabilitating individual campsites and providing a laundry and shower facility would make visitor stays more pleasant.

Enlarging the marina store would reduce crowding at peak times and make shopping less time-consuming for visitors. Screening the service vehicle parking area would eliminate this visual intrusion for visitors.

Expanding the boat repair shop and providing additional boat trailer storage would better meet the needs of boating visitors. Dredging the entrance to the bay would make boating safer.

Restoring disturbed areas to a more natural appearance at Natural Bridge would enhance the natural setting.

Alternative A (No Action)

Under alternative A visitors would continue to experience long delays for campsite registration. The marina store would continue to be crowded during peak times, and service vehicles would be clearly obvious to visitors. Congested and sometimes unsafe conditions would continue at the marina.

At Natural Bridge the visitor experience would continue to be limited.

DESCRIPTION

Four concessioners operate under contracts with the National Park Service at the Lake and Bridge Bay developed areas. The Lake Hotel and Lodge and the Bridge Bay marina are operated by TW Recreational Services. Hamilton Stores operates the Lake general store and the Bridge Bay marina store. Yellowstone Park Service Stations, which is owned by the National Park Service and Hamilton Stores, operates service stations within the park. The Lake hospital facilities are owned by the National Park Service and operated by Yellowstone Park Medical Services.

IMPACTS AT LAKE

Proposed Action

Redesigning roads to eliminate confusion and placing additional interpretive emphasis on Lake would probably bring more visitors to the area.

Moving the service station/auto repair facility to the Lake developed area would concentrate visitor services in this area. Moving the post office to the site of the service station/auto repair facility would make access easier for visitors and employees. It appears from a preliminary analysis that the concessioner could afford to construct the new facilities and related employee housing.

It is not anticipated that the changes called for under the proposed action would have a significant effect on concession facilities and services offered by TW Recreational Services. Guest services would not materially change. Proposed changes in employee housing and facilities would result in improved facilities for employees as well as allow the removal of unattractive buildings from the area. These employee facilities would likely be constructed with capital improvement and maintenance program funds provided by the concessioner.

Alternative A (No Action)

The impacts on the service station concessioner would be the same as those described for the proposed action.

Alternative B

The additional interpretive emphasis on Lake, along with the redesigned roads leading to the new visitor contact facility, would bring more visitors past the new general store location. Rehabilitating the existing service station and building a new auto repair facility at Fishing Bridge would allow larger vehicles to be served more efficiently. It appears from a preliminary analysis that the concessioner could afford to construct the new facilities and related employee

housing. Impacts on concessions resulting from lodging and food services would be similar to those described for the proposed action.

IMPACTS AT BRIDGE BAY

Proposed Action

The availability of a secured long-term boat storage area would allow for increased slip usage and boat storage income for the concessioner. Additional income would also result from an expanded boat repair work space. Improvements to the marina and boat repair facilities would likely be funded through the capital improvement and maintenance funds provided by the concessioner under the terms of the contract.

Expanding the marina store would alleviate existing crowded conditions, would allow space for some additional sale items, and would potentially result in increased sales.

Constructing a laundry/shower facility in the campground or marina area would provide additional income for the concessioner. This project would likely be funded through the concessioner's capital improvement and maintenance funds.

Alternative A (No Action)

No additional sales for concessioners would be generated under this alternative. Crowded conditions would continue at the store, and at times at the boat repair facility and marina.

IMPACTS AT LAKE

Proposed Action

Implementing the proposed action at Lake would require additional personnel to staff the new fish hatchery exhibit and to monitor fish spawning and bear activity.

The morale of NPS employees and their families would be promoted by building a community center in the maintenance and housing area. These facilities could contribute to job efficiency and improve staff recruitment and retention. Concession employees' morale would be promoted by constructing an employee pub and recreation area in the employee housing area.

A new fire station at the Lake developed area and an expanded station at the nearby maintenance and housing complex would make access easier and would improve response time to fires in the northwest Lake Yellowstone area.

Emergency medical facilities would be improved with the construction of a permanent helipad near the hospital.

Redesigning the maintenance area would make maintenance operations more efficient. The total length of roads to be maintained would not be significantly changed from the present situation.

Constructing additional housing units for NPS employees, along with upgrading existing housing, would improve employee morale by providing better housing with increased privacy, additional interior and storage space, and better furnishings. Recreation and community facilities also would be improved. Concessioner needs for additional housing would be satisfied, and general housing conditions would be improved.

Alternative A (No Action)

Maintenance operations for the Lake developed area would continue to be based in cramped and poorly designed facilities. Housing for NPS employees would remain substandard. Many old structures that might otherwise be replaced would have to be refurbished or frequently maintained. Office space at the existing ranger station would continue to be inadequate. Emergency responses to fires within the Lake area would continue to be slowed by poor access and by the current distribution of fire apparatus.

Alternative B

Implementing alternative B would result in essentially the same impacts on park management and operations as described for the proposed action. Additional personnel would be required to staff the visitor contact facility along the lakeshore.

IMPACTS AT BRIDGE BAY

Proposed Action

Enlarging the campground registration building and redesigning the registration area would contribute to more efficient operations at Bridge Bay. Waiting time for registering visitors would be reduced, thereby alleviating congestion in that area.

Expanding the ranger station/residence would provide ample space for management activities (information and orientation and backcountry permit distribution), and relocating it would increase privacy for employees during off-duty hours.

Ample space would be provided for service parking and vehicle turnaround at this location.

Alternative A (No Action)

The campground registration building would continue to be inadequate, resulting in vehicle waiting lines at the campground entrance and traffic congestion. Space would be insufficient for service vehicles to park and maneuver at the store. The ranger station/residence would remain inadequate.

CONSULTATION

The National Park Service consulted with the following agencies, organizations, and individuals during the preparation of this document:

Federal Agencies

Advisory Council on Historic Preservation
Department of Defense, U.S. Army Corps of Engineers
Department of the Interior, U.S. Fish and Wildlife Service
U.S. Postal Service

State Agencies

Wyoming State Historic Preservation Office

Organizations

Hamilton Stores, Inc.
TW Recreational Services, Inc.
Yellowstone Park Medical Services
Yellowstone Park Service Stations

APPENDIX / REFERENCES CITED / PLANNING TEAM AND CONSULTANTS

Bridge Bay Marina

PROPOSED ACTION — LAKE VILLAGE
(IN THOUSANDS OF DOLLARS)

DEVELOPMENT ITEM	QUANTITY	GROSS	PLANNING	TOTAL
National Park Service				
Lake Village				
Construct walkway (6' wide)	2,900 lf	30	6	36
Construct hiking trail (10' wide)	4.5 mi	248	47	295
Renovate ranger station	5,000 sf	98	19	117
Renovate former gas station	1,500 sf	138	26	164
Construct fire station	2,500 sf	360	69	429
Provide utilities	Lump sum	98	19	117
Construct roads	3,600 lf	490	94	584
Remove roads, parking; restore sites	7,300 sy	105	20	125
Construct trail to Fishing Bridge	3 mi	165	32	197
Remove asphalt	2 mi	183	35	218
Subtotal–Lake		1,915	367	2,282
NPS Maintenance/Housing Area				
Construct south district office	2,000 sf	341	65	406
Construct maintenance offices, shops	10,000 sf	1,441	275	1,716
Construct fire station	2,000 sf	288	55	343
Construct employee housing:				
• Year-round units	25	3,930	750	4,680
• Seasonal units	58	6,078	1,160	7,238
Rehabilitate existing housing:				
• Year-round units	6	393	75	468
• Seasonal units	33	1,297	248	1,545
Provide employee RV sites, with utilities	7 sites	229	44	273
Construct community center	1,600 sf	210	40	250
Construct trail to Lake Village	3,000 lf	31	6	37
Construct access roads	3,000 lf	409	78	487
Construct parking	5,000 sf	66	13	79
Subtotal–NPS Maintenance/Housing		14,713	2,809	17,522
Natural Resource Management Actions				
Rehabilitate the Otter Creek area	3.5 ac	197	38	235
Rehabilitate the Little Thumb Creek area	11.5 ac	655	125	780
Comprehensive revegetation/ rehabilitation of Lake area	Lump sum	524	100	624
Extra personnel for late night bear patrol and for spawning surveys, etc.				23
Subtotal–Natural Resource Management		1,376	263	1,662
Total NPS Cost		**18,004**	**3,439**	**21,466**
U.S. Postal Service				
Construct post office	2,500 sf	312	60	372
Parking area	5 cars	9	2	11
Remove existing post office, restore site	25,000 cf; 280 sy	20	4	24
Total Postal Service Cost		**341**	**66**	**407**

Development Item	Quantity	Gross	Planning	Total
U.S. Fish and Wildlife Service				
Stabilize 9 USFWS buildings	12,848 total sf	1,178	225	1,403
Rehabilitate 1 boathouse	8,000 total sf	734	140	874
Remove 1 boathouse, restore site	Lump sum	52	10	62
Total U.S. Fish and Wildlife Service Cost		**1,964**	**375**	**2,339**

Concessioners — Lake Village		Total
HSI construction items		
• Visitor parking	40 cars/8 RVs/3 buses	94
• 45 employee dorm rooms	28,100 total sf	1,967
• Employee parking	65 cars	91
• Employee RV sites	51 sites	1,275
Subtotal–HSI		3,427
TWRS construction items		
• Redesigned hotel parking	250 cars/10 RVs	380
• 60 employee dorm rooms	37,500 total sf	2,625
• Employee parking	150 cars	210
• Employee RV sites	27 sites	675
• Winter maintenance person's residence	Lump sum	40
• Removal of laundry, dorm, cabins, and site restoration	Lump sum	160
Subtotal–TWRS		4,090
YPSS construction items		
• 10 employee dorm rooms	6,250 sf	438
• Employee parking	20 cars	28
• Employee RV sites	5 sites	125
• Service station/ auto repair facility	Lump sum	513
• Parking area (service station)	15 cars/3 RVs	30
Subtotal–YPSS		1,134
YPMS construction items		
• 20 nurses quarters	9,000 total sf	765
• Employee parking	20 cars	28
• Renovation of dorm into 4 quarters	Lump sum	350
• Renovation of hospital interior	Lump sum	125
• Helipad	Lump sum	30
Subtotal–YPMS		1,298
Employee recreation hall and pub	3,000 sf	300
Total Concessioner Costs		**10,249**

PROPOSED ACTION — BRIDGE BAY/NATURAL BRIDGE
(IN THOUSANDS OF DOLLARS)

DEVELOPMENT ITEM	QUANTITY	GROSS	PLANNING	TOTAL
National Park Service				
Campground				
Rehabilitate campsites	420 sites	413	79	492
Rehabilitate amphitheater	750 seats	197	38	235
Rehabilitate comfort stations	16 stations	419	80	499
Enlarge registration building	240 sf	30	6	36
Renovate ranger station	400 sf	50	10	60
Construct ranger residence	Lump sum	52	10	62
Resurface campground road	24,000 lf	1,729	330	2,059
Rehabilitate sewage lift station, add one new station	Lump sum	197	38	235
Remove existing road, restore site	6,700 sy	97	19	116
Screen amphitheater (two sides)	600 trees	197	38	235
Fill borrow pits	17,000 cy	557	106	663
Subtotal–Campground		3,938	754	4,692
Marina				
Renovate ranger station	1,800 sf	1,179	225	1,404
Expand camper store, provide walkway and fence	1,000 sf	92	18	110
Repair marina bulkhead	900 lf	590	113	703
Dredge entrance to Bridge Bay	2,400 cy	94	18	112
Construct long-term trailer parking	15,000 sf	59	11	70
Subtotal–Marina		2,014	385	2,399
Entrance				
Improve road	3,000 lf	255	49	304
Natural Resource Management Actions				
Comprehensive revegetation/ rehabilitation of Bridge Bay area	Lump sum	2,620	500	3,120
Subtotal–Bridge Bay		8,827	1,688	10,515
Natural Bridge				
Provide wayside interpretive exhibits	Lump sum	39	8	47
Construct trailhead parking	15 cars	31	6	37
Correct erosion, restore site	Lump sum	26	5	31
Rehabilitate Natural Bridge area	Lump sum	786	150	936
Subtotal–Natural Bridge		882	169	1,051
Total NPS Cost		**10,794**	**2,064**	**12,858**
Concessioner				
Install new sewage pump	Lump sum			15
Relocate fuel storage area	Lump sum			150
Repair, expand boat building	1,200 sf			102
Construct laundry/shower building	3,800 sf			361
Total Concessioner Cost				**628**

Alternative A — Lake Village / Bridge Bay
(in thousands of dollars)

Development Item	Quantity	Gross	Planning	Total
Bridge Bay Marina – National Park Service				
Dredge entrance to Bridge Bay	2,400 cy	94	18	112
Lake Village – Concessioner				**Total**
HSI construction items				
• 45 employee dorm rooms	28,100 total sf			1,967
• Employee parking	65 cars			91
Subtotal–HSI				2,058
YPSS construction items				
• 10 employee dorm rooms	6,250 sf			438
• Employee parking	20 cars			28
• Service station/auto repair facility	Lump sum			513
• Parking area (service station)	15 cars/3 RVs			30
Subtotal–YPSS				1,009
Total Concessioner Costs				**3,067**

ALTERNATIVE B — LAKE VILLAGE
(IN THOUSANDS OF DOLLARS)

DEVELOPMENT ITEM	QUANTITY	GROSS	PLANNING	TOTAL
National Park Service				
Lake Village				
Rehabilitate general store as visitor contact facility	Lump sum	983	188	1,171
Provide parking at visitor contact facility	150 cars/6 RVs/ 3 buses	317	61	378
Construct outdoor plaza	10,000 sf	98	19	117
Construct walkway (12' wide)	2,500 lf	52	10	62
Renovate ranger station	5,000 sf	98	19	117
Renovate former gas station	1,500 sf	138	26	164
Construct fire station	2,500 sf	360	69	429
Construct hiking/biking trail	4.5 mi	248	47	295
Provide utilities	Lump sum	98	19	117
Construct roads	6,800 lf	926	177	1,103
Remove roads and parking, restore sites	9,300 sy	134	26	160
Construct trail to Fishing Bridge	3 mi	165	32	197
Remove asphalt	2 mi	183	35	218
Subtotal–Lake Village		3,800	728	4,528
NPS Maintenance/Housing Area				
Construct south district office	2,000 sf	341	65	406
Construct maintenance offices, shops	10,000 sf	1,441	275	1,716
Construct fire station	2,000 sf	288	55	343
Construct employee housing				
• Year-round units	25	3,930	750	4,680
• Seasonal units	58	6,078	1,160	7,238
Rehabilitate existing housing:				
• Year-round units	6	393	75	468
• Seasonal units	33	1,297	248	1,545
Provide employee trailer sites, with utilities	7 sites	229	44	273
Construct community center	1,600 sf	210	40	250
Construct trail to Lake Village	3,000 lf	31	6	37
Construct access roads	3,000 lf	409	78	487
Construct parking	5,000 sf	66	13	79
Subtotal–Maintenance Housing Area		14,713	2,809	17,522
Fishing Bridge				
Construct access roads	1,000 lf	136	26	162
Construct parking area	15 cars	30	6	36
Subtotal–Fishing Bridge		166	32	198
Natural Resource Management Actions				
Rehabilitate the Otter Creek area	3.5 ac	197	38	235
Rehabilitate the Little Thumb Creek area	11.5 ac	655	125	780
Comprehensive revegetation/ rehabilitation of Lake area	Lump sum	524	100	624
Extra personnel for late night bear patrol and for spawning surveys, etc.				23
Subtotal–Resource Management Actions		1,376	263	1,662
Total NPS Cost		**20,055**	**3,832**	**23,910**

Development Item	Quantity	Gross	Planning	Total
U.S. Postal Service				
Construct post office	2,500 sf	312	60	372
Construct parking area	5 cars	9	2	11
Remove existing post office and restore site	25,000 cf; 280 sy	20	4	24
Total Postal Service Cost		**341**	66	**407**
U.S. Fish and Wildlife Service				
Stabilize 9 USFWS buildings	12,848 total sf	1,178	225	1,403
Remove 2 boathouses, restore site	Lump sum	80	15	95
Total U.S. Fish and Wildlife Service Cost		**1,258**	**240**	**1,498**

Concessioners		Total
Lake Village		
HSI construction items		
• Visitor parking	25 cars/6 RVs/3 buses	67
• General store and employee quarters	8,200 sf	902
• Winter maintenance person's residence	Lump sum	40
• 45 employee dorm rooms	28,100 total sf	1,967
• Employee parking	65 cars	91
• Employee RV sites	51 sites	1,275
Subtotal–HSI		4,342
TWRS construction items		
• Redesigned hotel parking	250 cars/10 RVs	380
• 60 employee dorm rooms	37,500 total sf	2,625
• Employee parking	150 cars	210
• Employee RV sites	27 sites	675
• Winter maintenance person's residence	Lump sum	40
• Removal of laundry, dorm, cabins, and site restoration	Lump sum	160
Subtotal–TWRS		4,090
YPSS construction items		
• 10 employee dorm rooms	6,250 sf	438
• Employee parking	20 cars	28
• Employee RV sites	5 sites	125
• Upgrade Fishing Bridge service station, construct auto repair facility (YPSS)	Lump sum	480
Subtotal–YPSS		1,071
YPMS construction items		
• 20 nurses quarters	9,000 sf	765
• Employee and visitor parking	65 cars	91
• Helipad	Lump sum	30
• Renovation of hospital interior	Lump sum	125
Subtotal–YPMS		1,011
Employee recreation hall and pub	3,000 sf	300
Total Concessioner Costs		**10,814**

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Lore Williams, Landscape Architect

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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